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United States Patent [19]

Kodimer

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[45] Date of Patent: Jul. 14, 1998

[54] DATA TRANSFER SYSTEM

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[73] Assignee: Canon Information Systems, Inc., Irvine, Calif.

[21] Appl. No.: 586,092

[22] Filed: Jan. 16, 1996

[51] Int. Cl.⁶ G06F 3/00

[52] U.S. Cl. 345/340; 345/346

[58] Field of Search 395/340, 339, 395/343, 326; 345/340, 328, 329, 341, 342, 343, 344, 346, 347, 348, 352, 353, 359; 707/531

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Primary Examiner—Matthew M. Kim

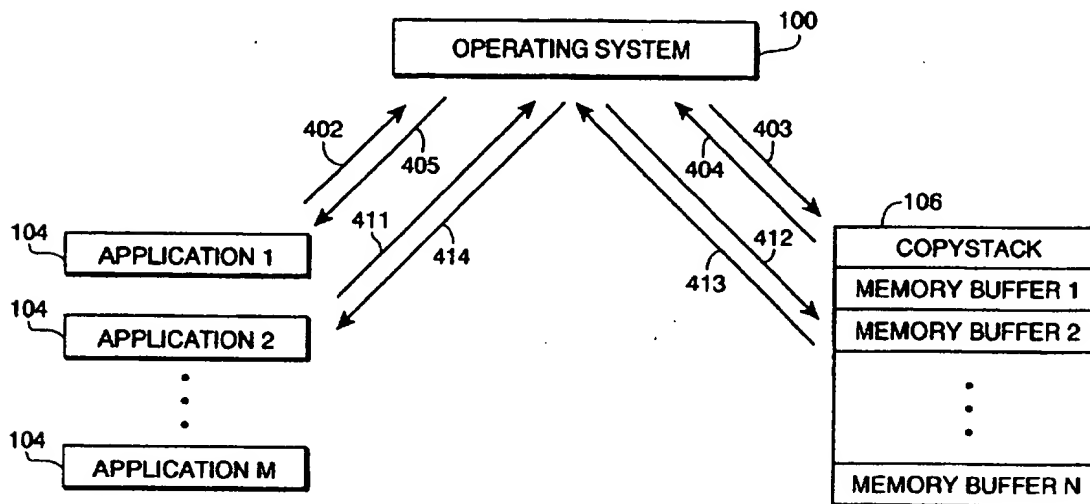
Assistant Examiner—Steven P. Sax

Attorney, Agent, or Firm—Fitzpatrick, Cella, Harper & Scinto

[57] ABSTRACT

A computer implemented method for storing data from an instance of an application program into at least one of a plurality of buffers includes the steps of bringing an application program into focus, selecting data in the application program, selecting a store operation such as a "cut" or a "copy" operation while the application program is in focus, selecting one of the buffers while the application program is still in focus, and automatically storing the selected data into the selected one of the buffers. In a similar manner, data can be recalled from the buffers, such as in a "paste" operation, and any one of the buffers selected, without ever leaving focus of the application to which the data is recalled.

81 Claims, 26 Drawing Sheets



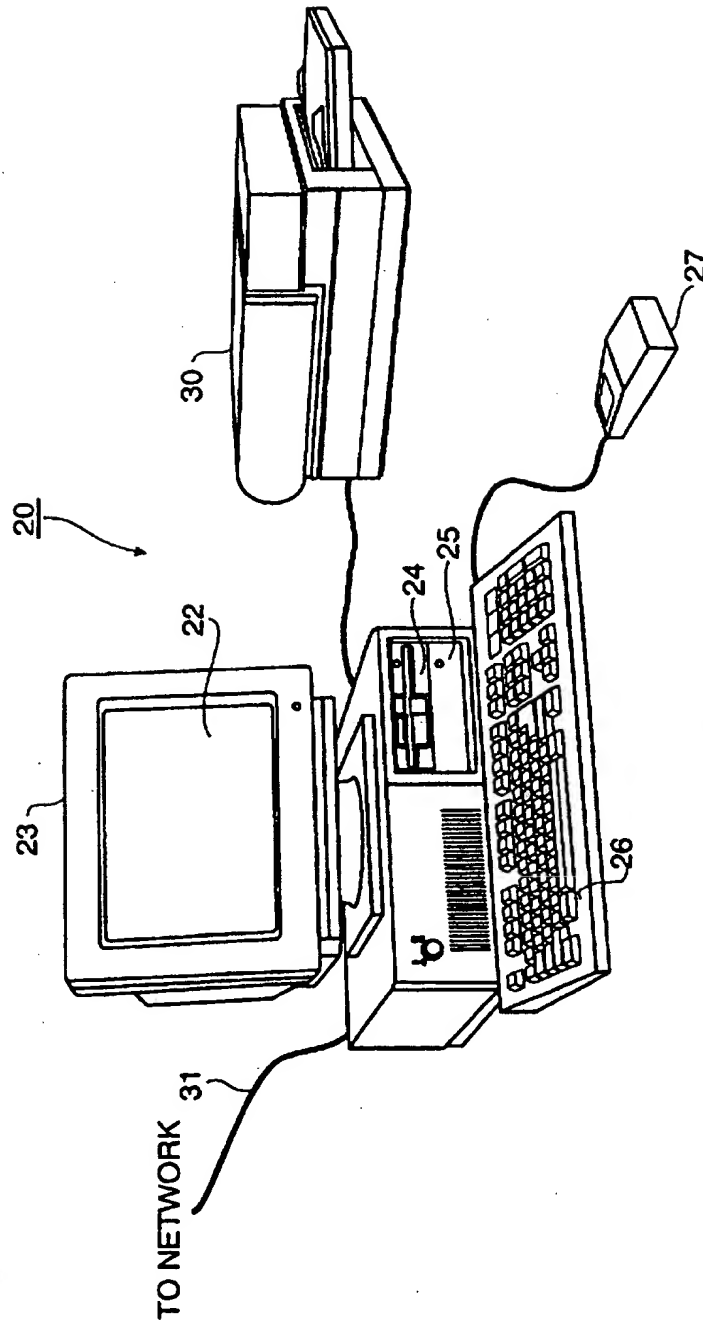


FIG. 1

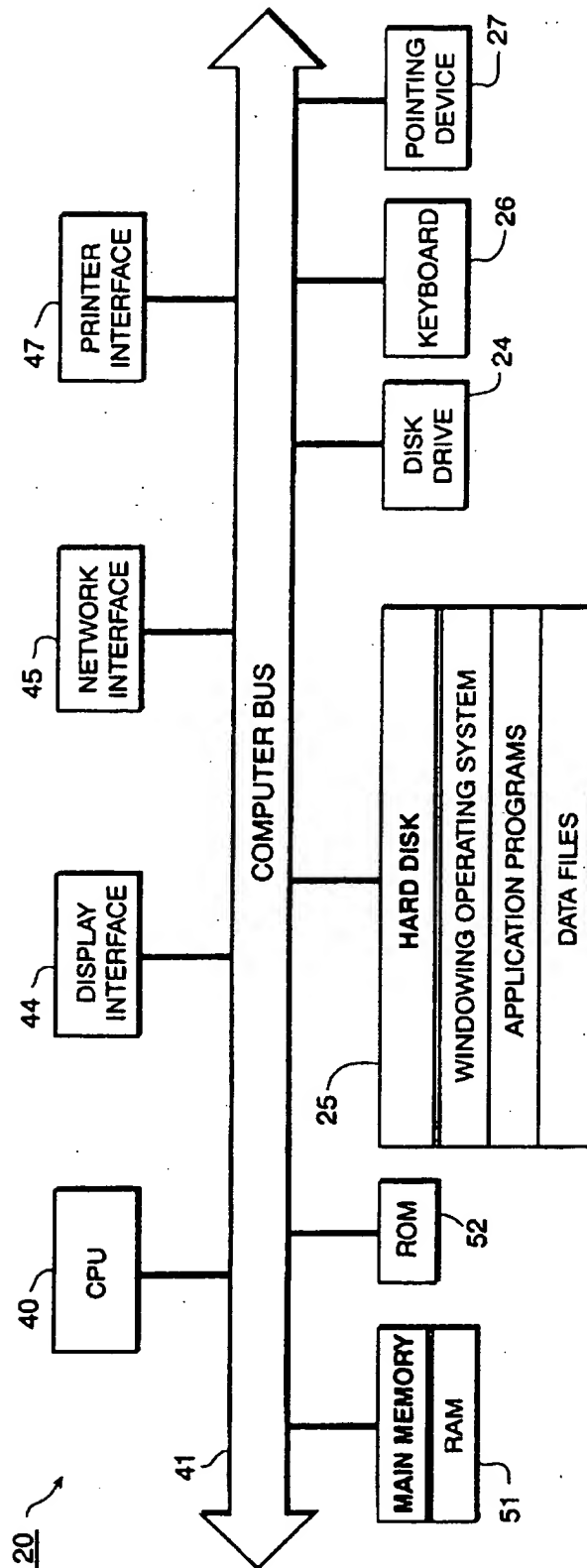


FIG. 2

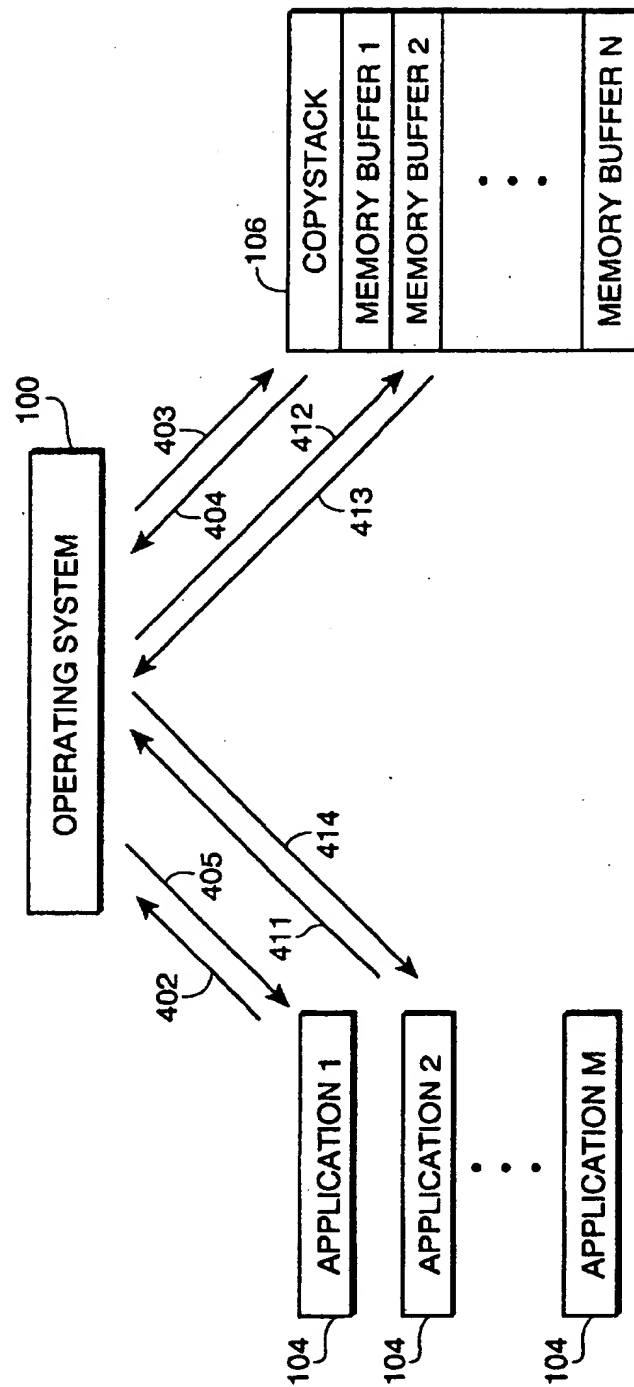


FIG. 3

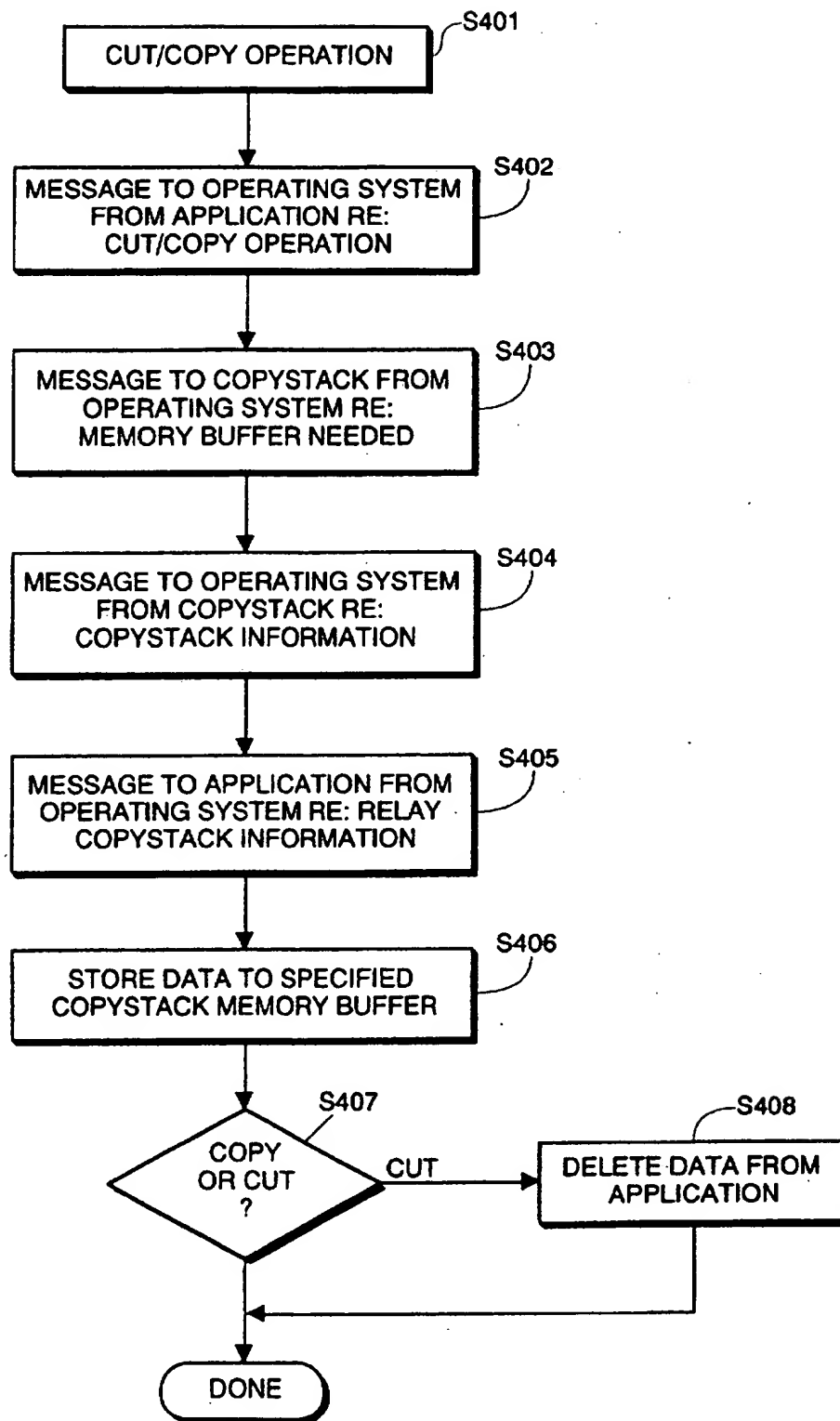


FIG. 4(a)

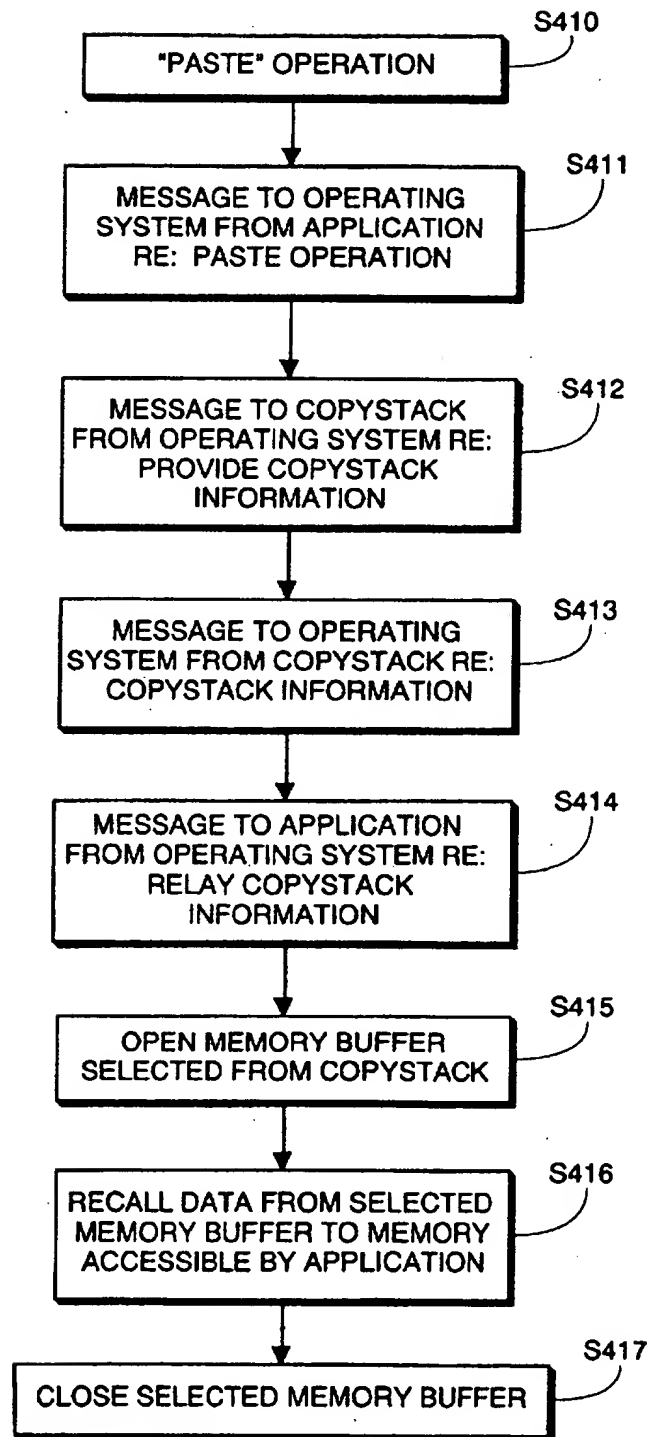


FIG. 4(b)

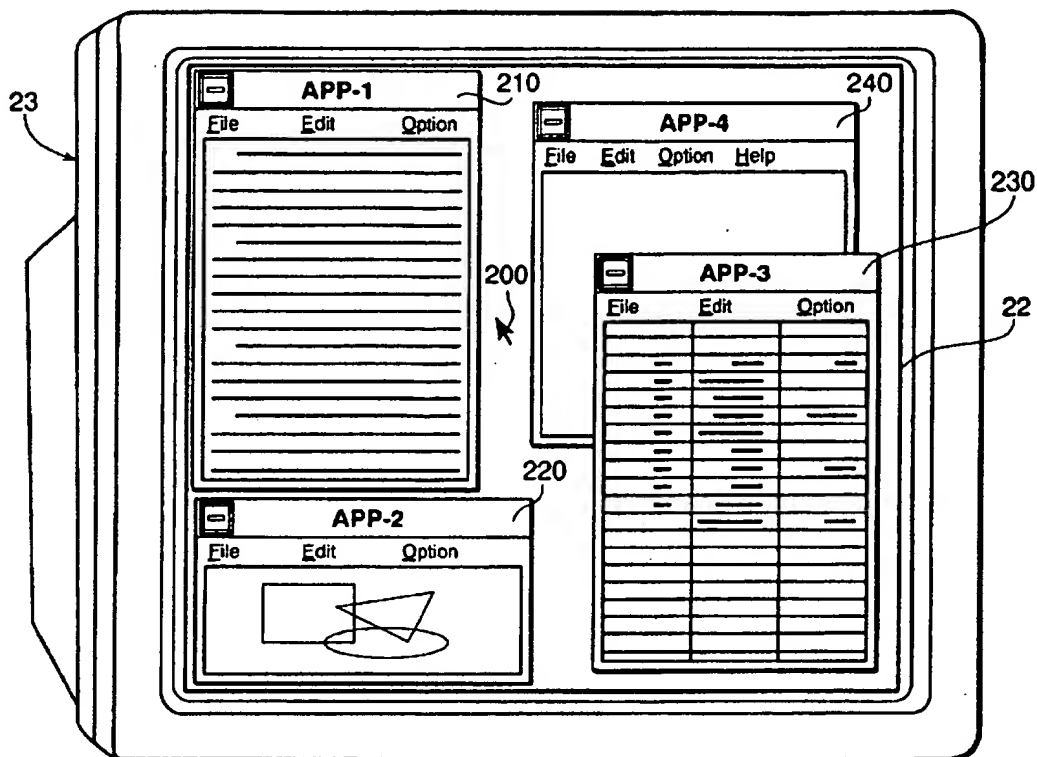


FIG. 5

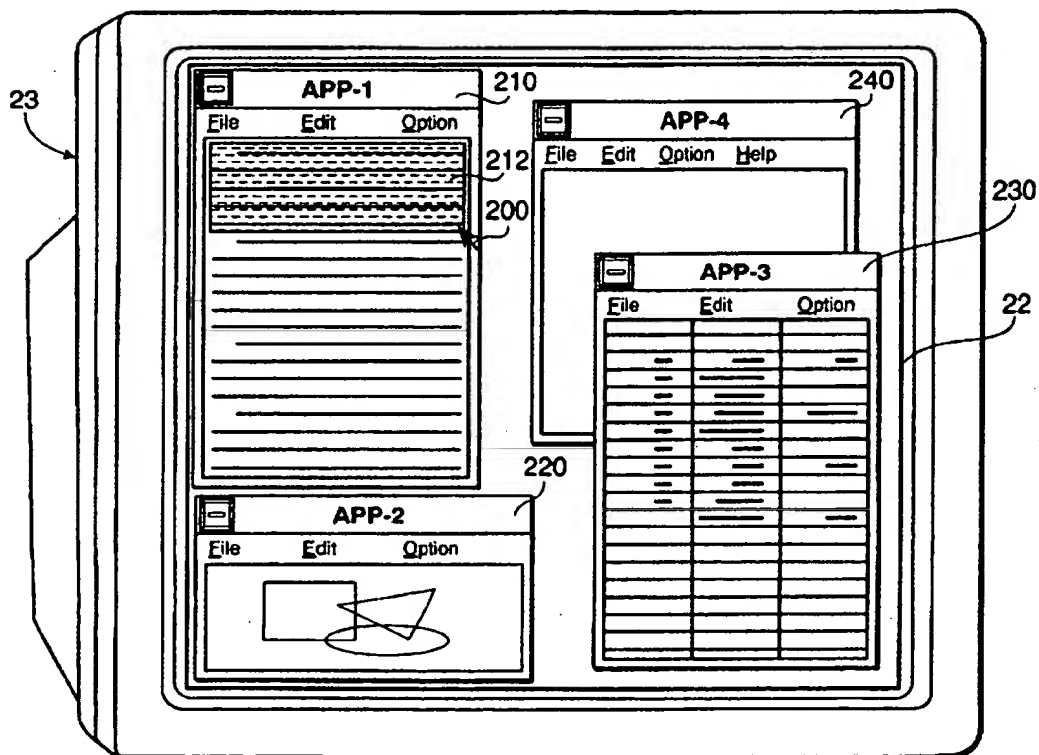


FIG. 6(a)

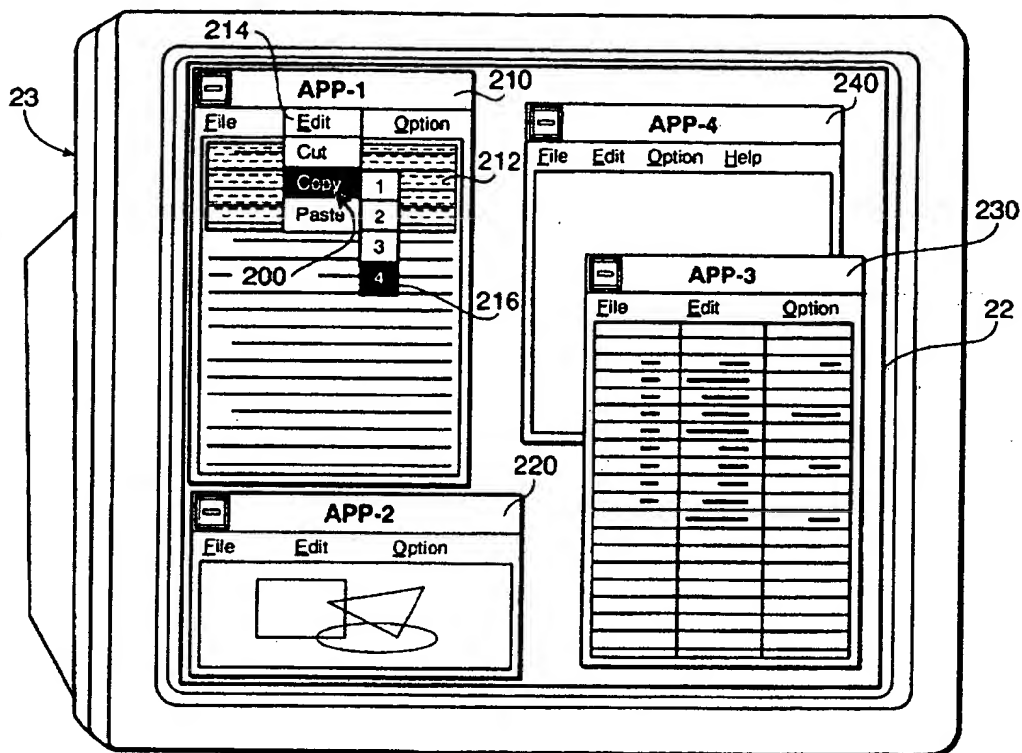


FIG. 6(b)

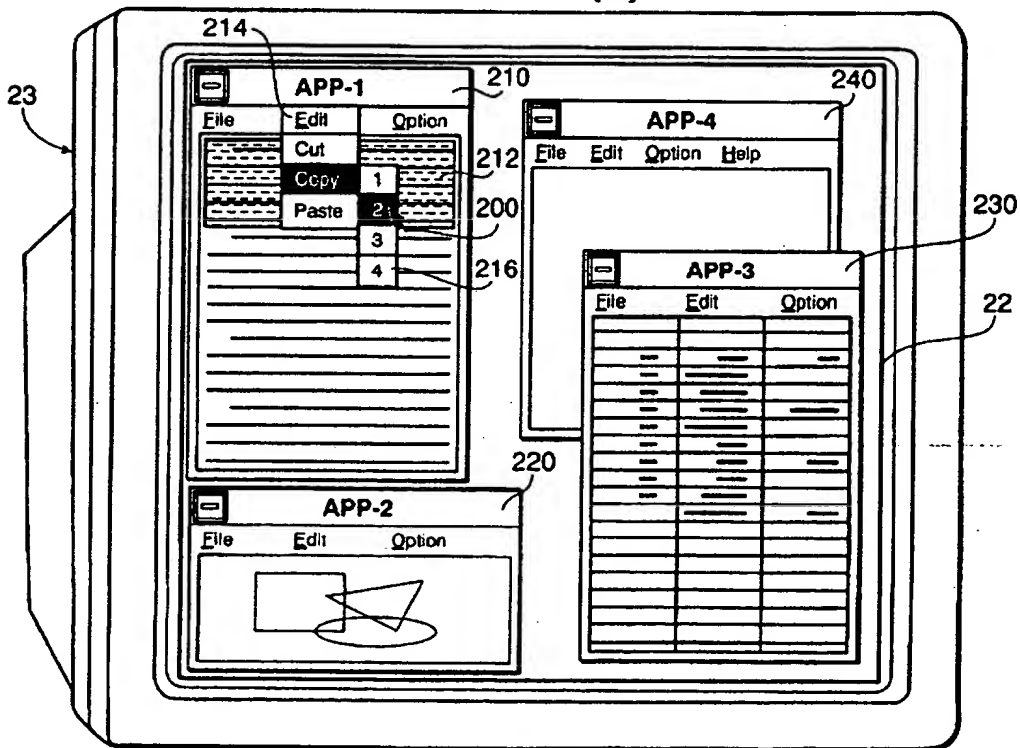


FIG. 6(c)

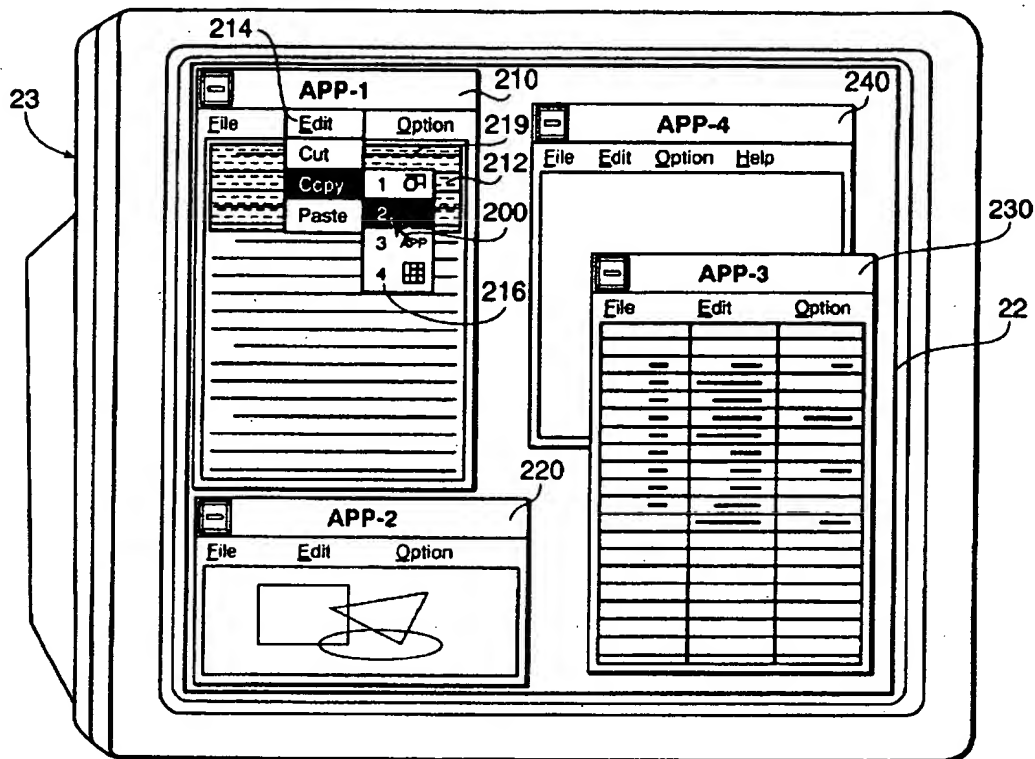


FIG. 6(d)

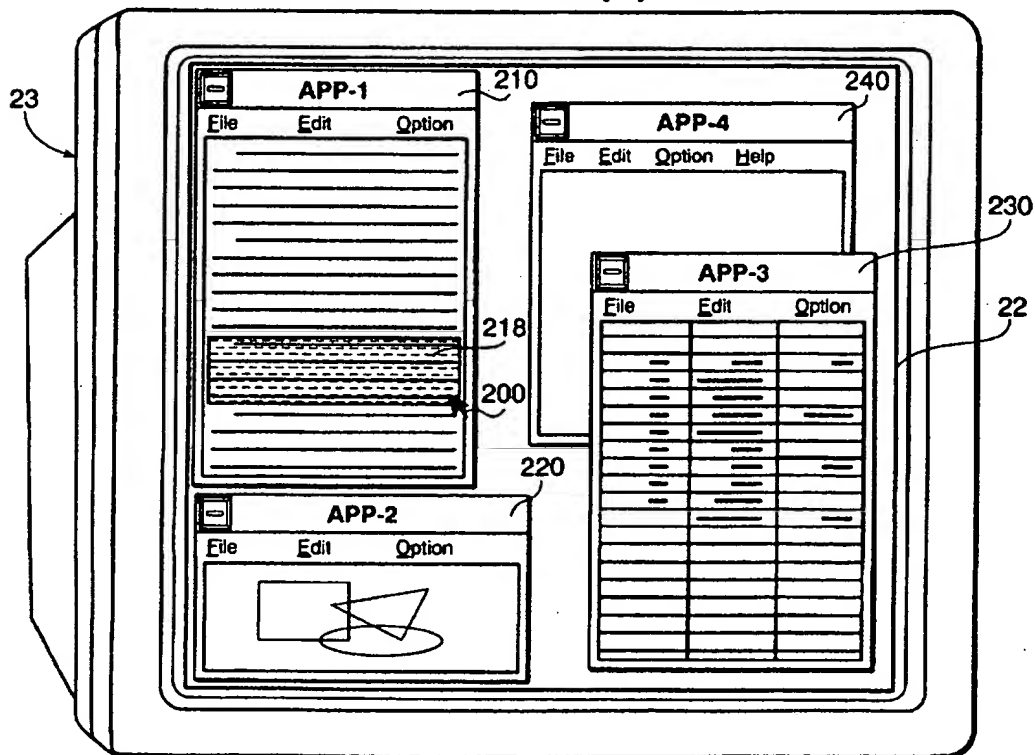
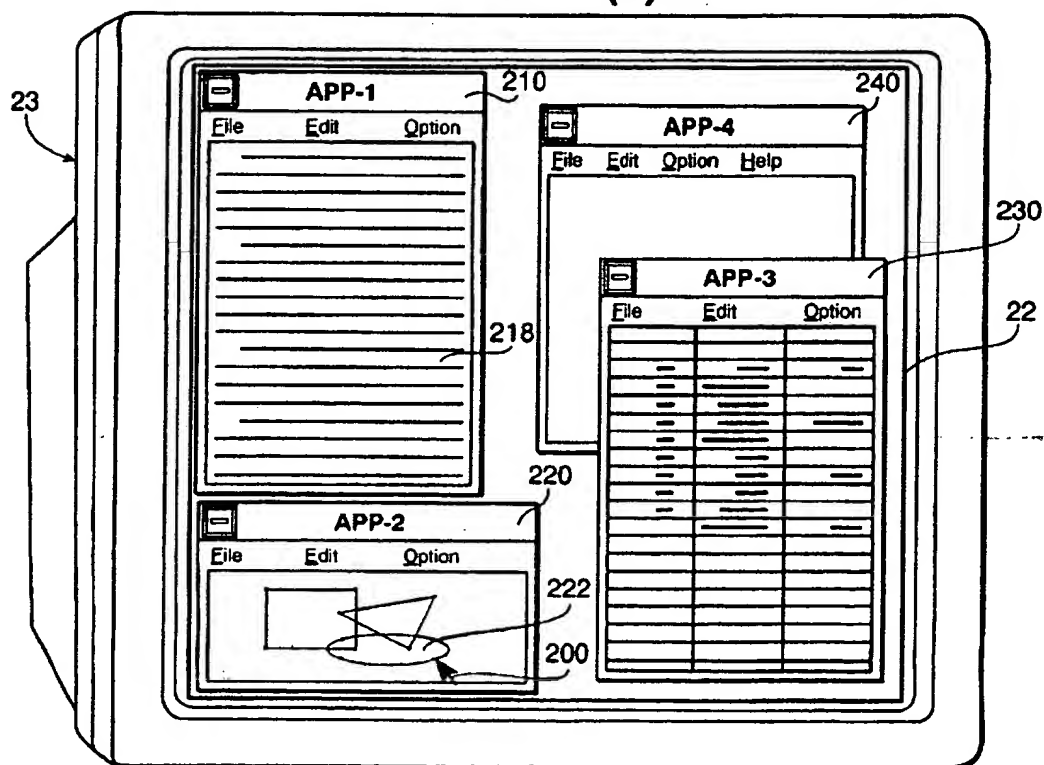
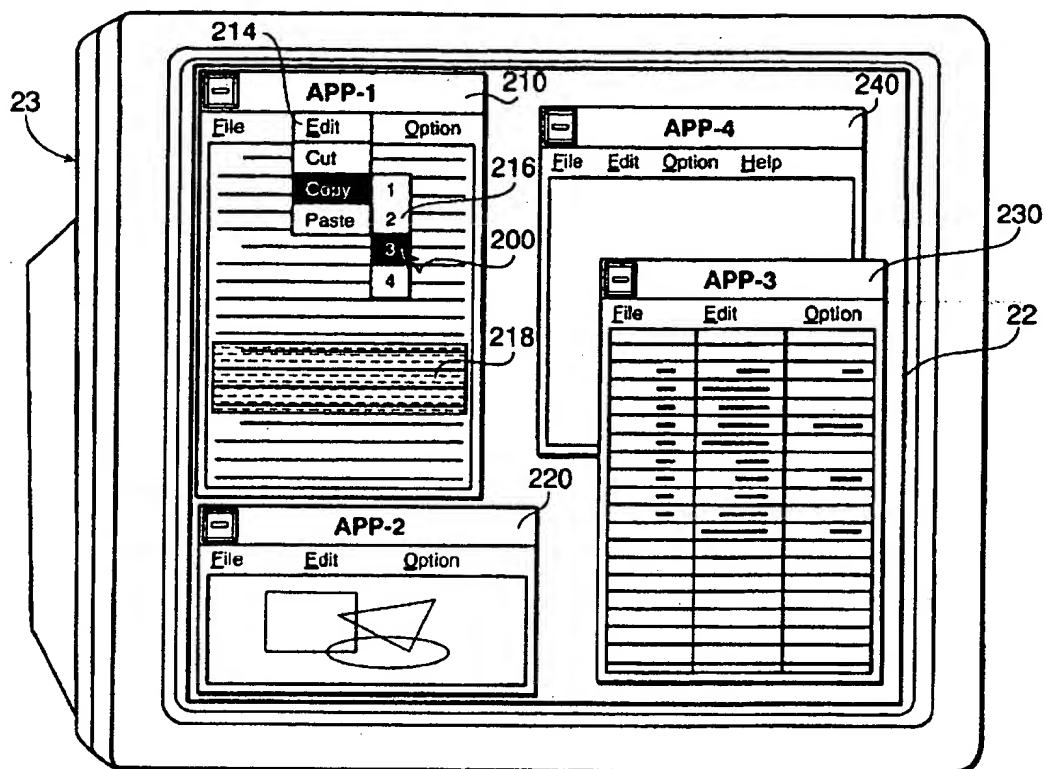


FIG. 7(a)



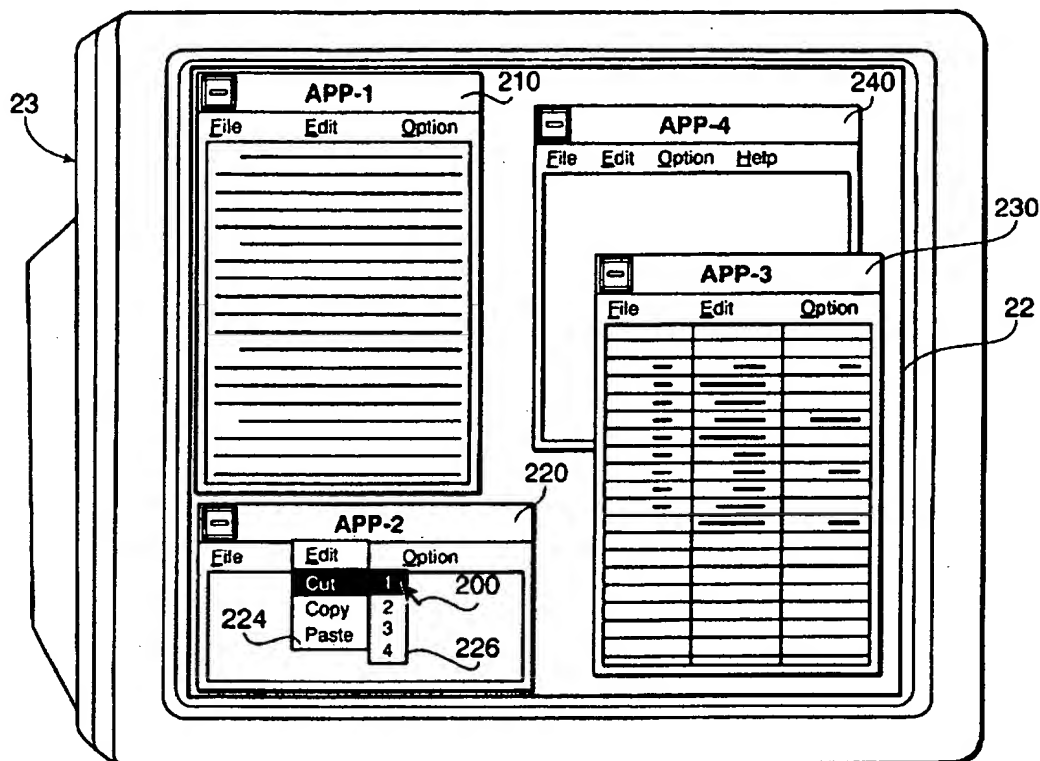


FIG. 8(b)

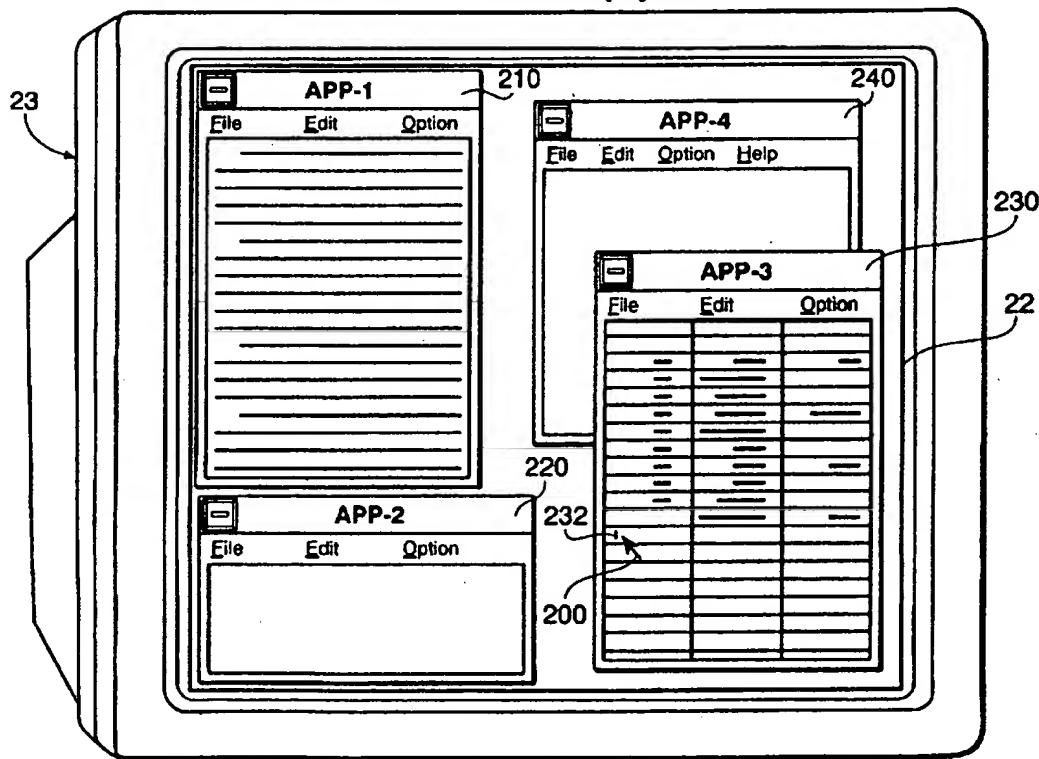


FIG. 9(a)

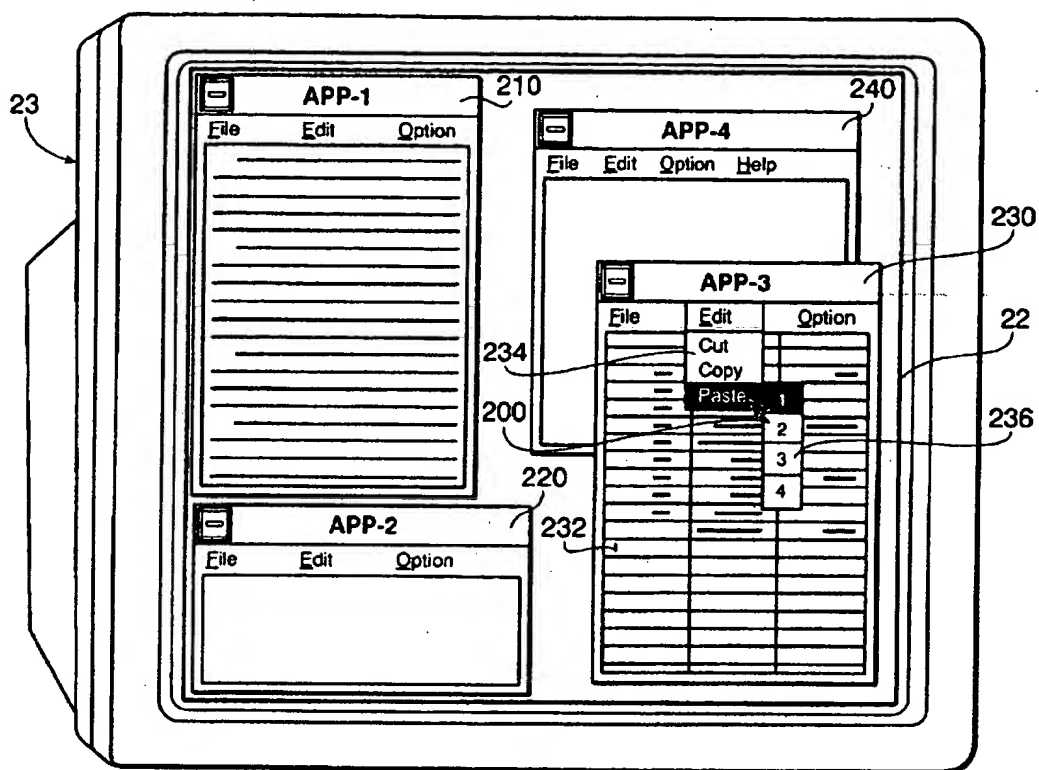


FIG. 9(b)

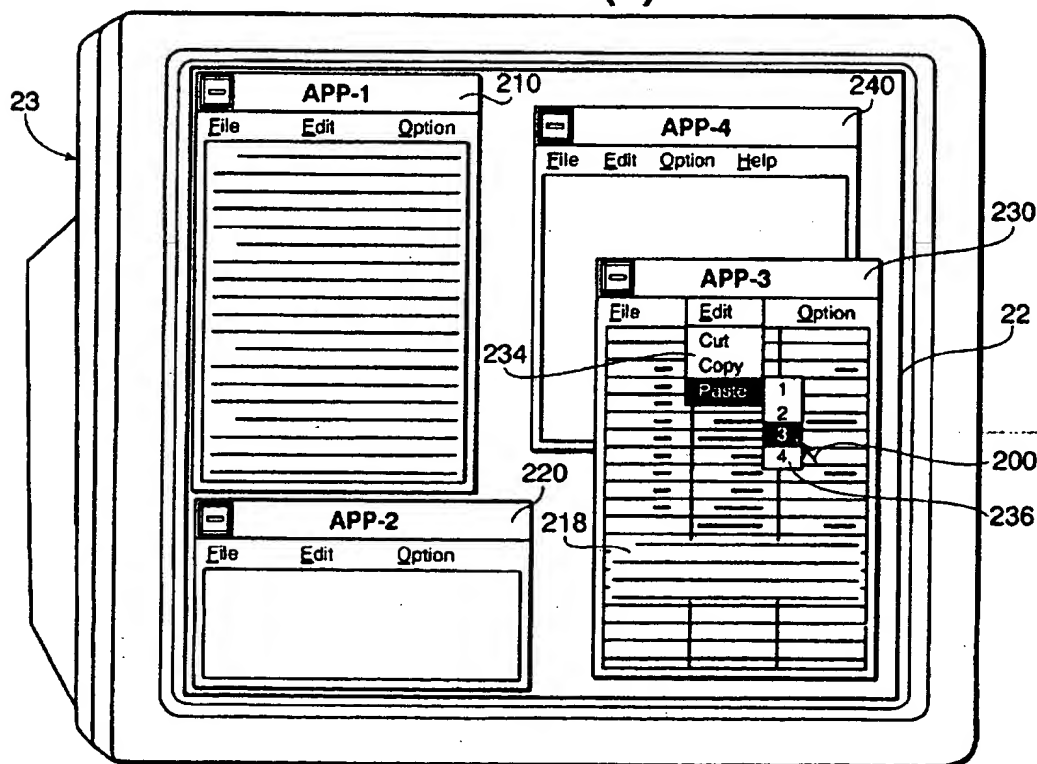


FIG. 9(c)

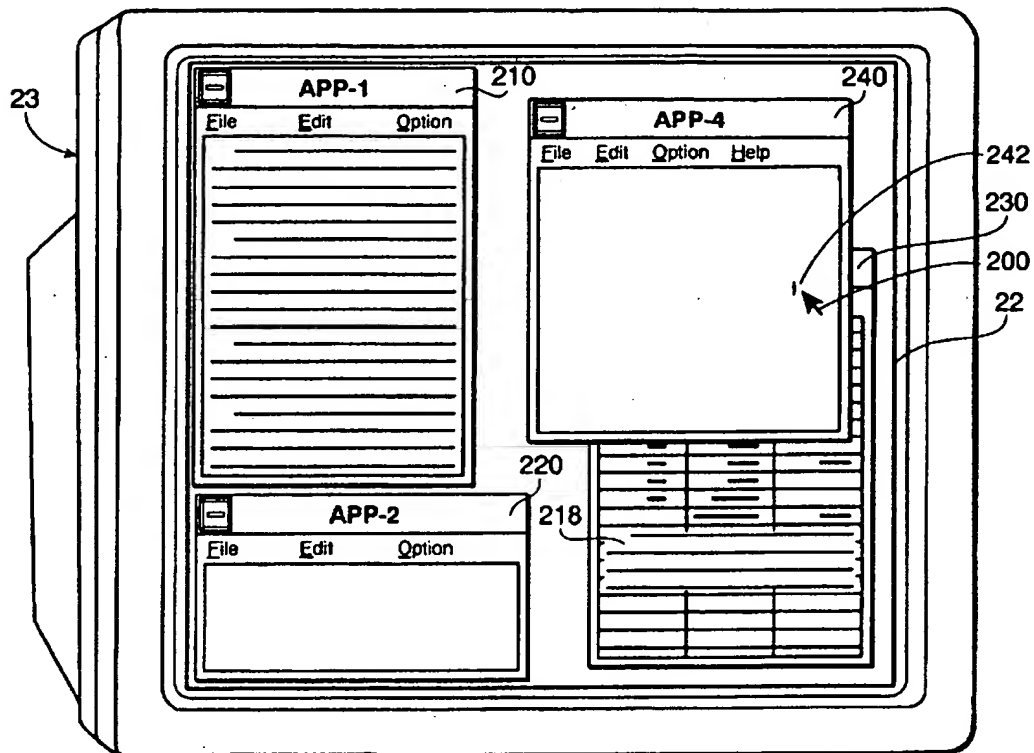


FIG. 10(a)

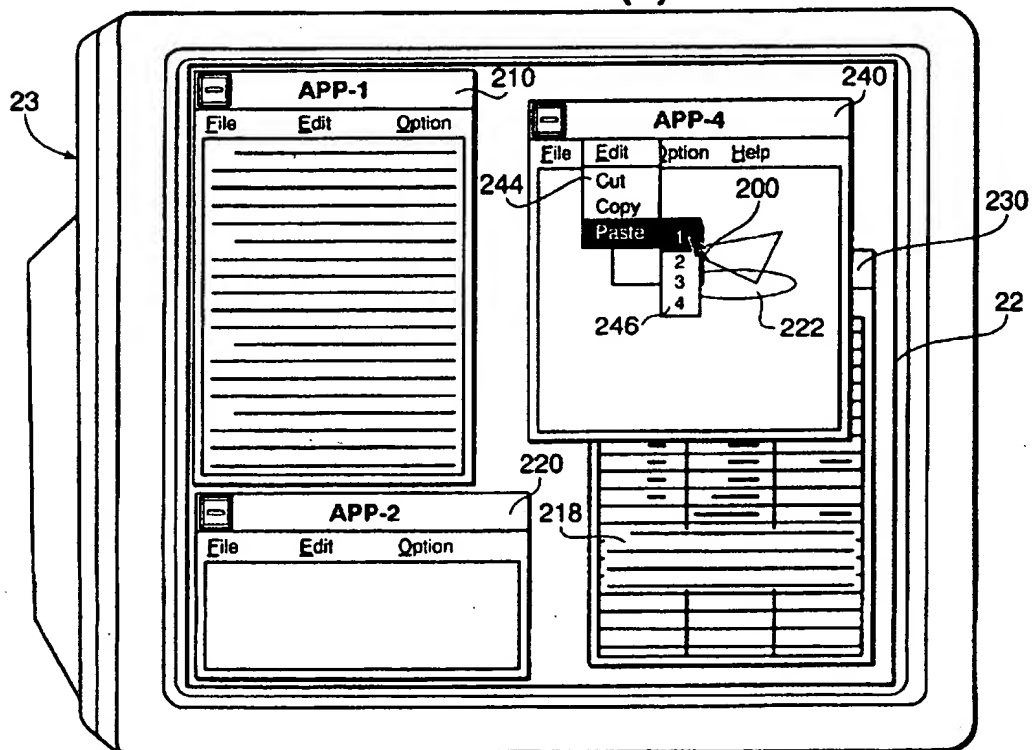


FIG. 10(b)

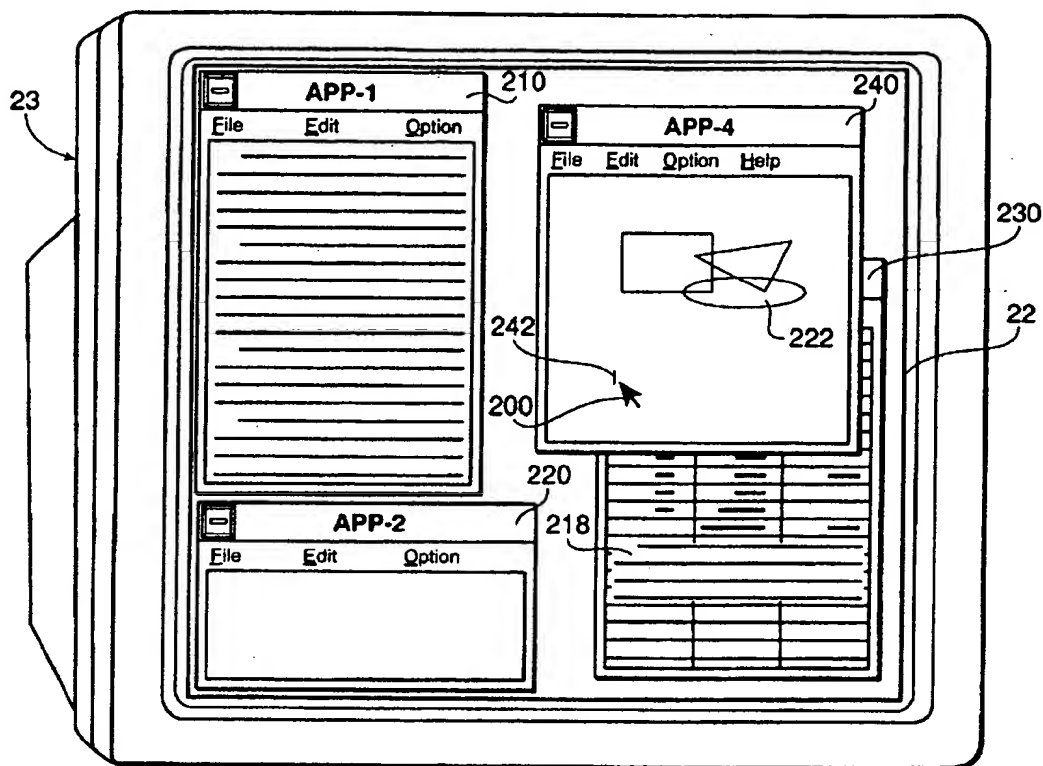


FIG. 11(a)

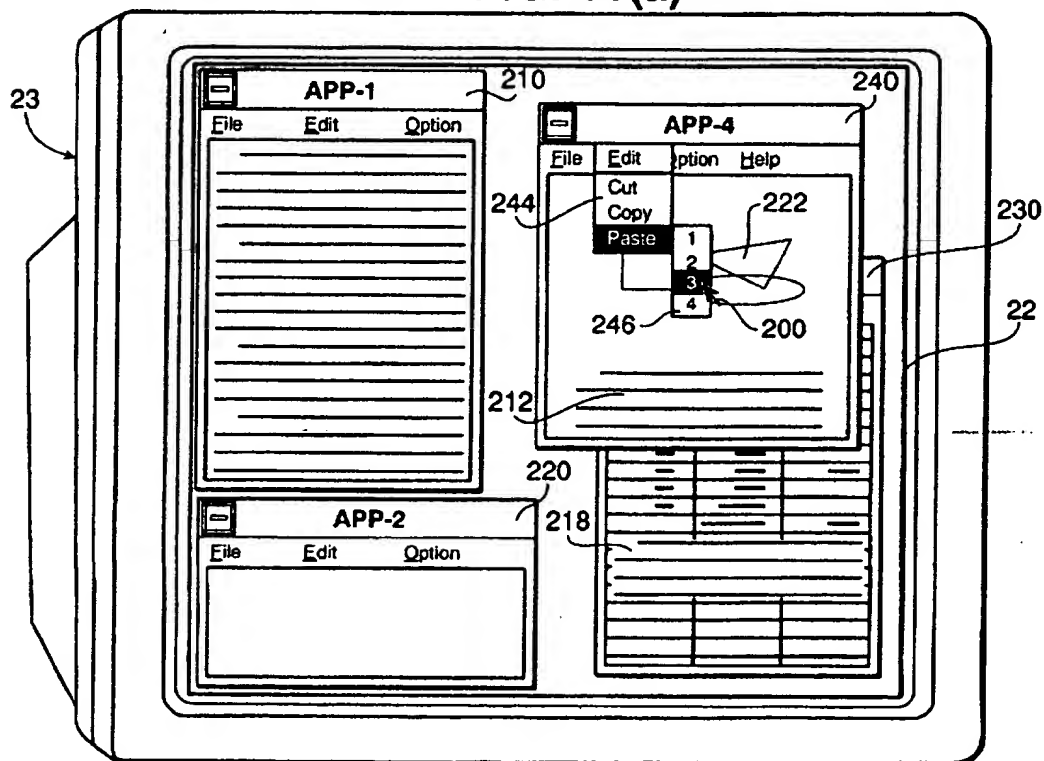


FIG. 11(b)

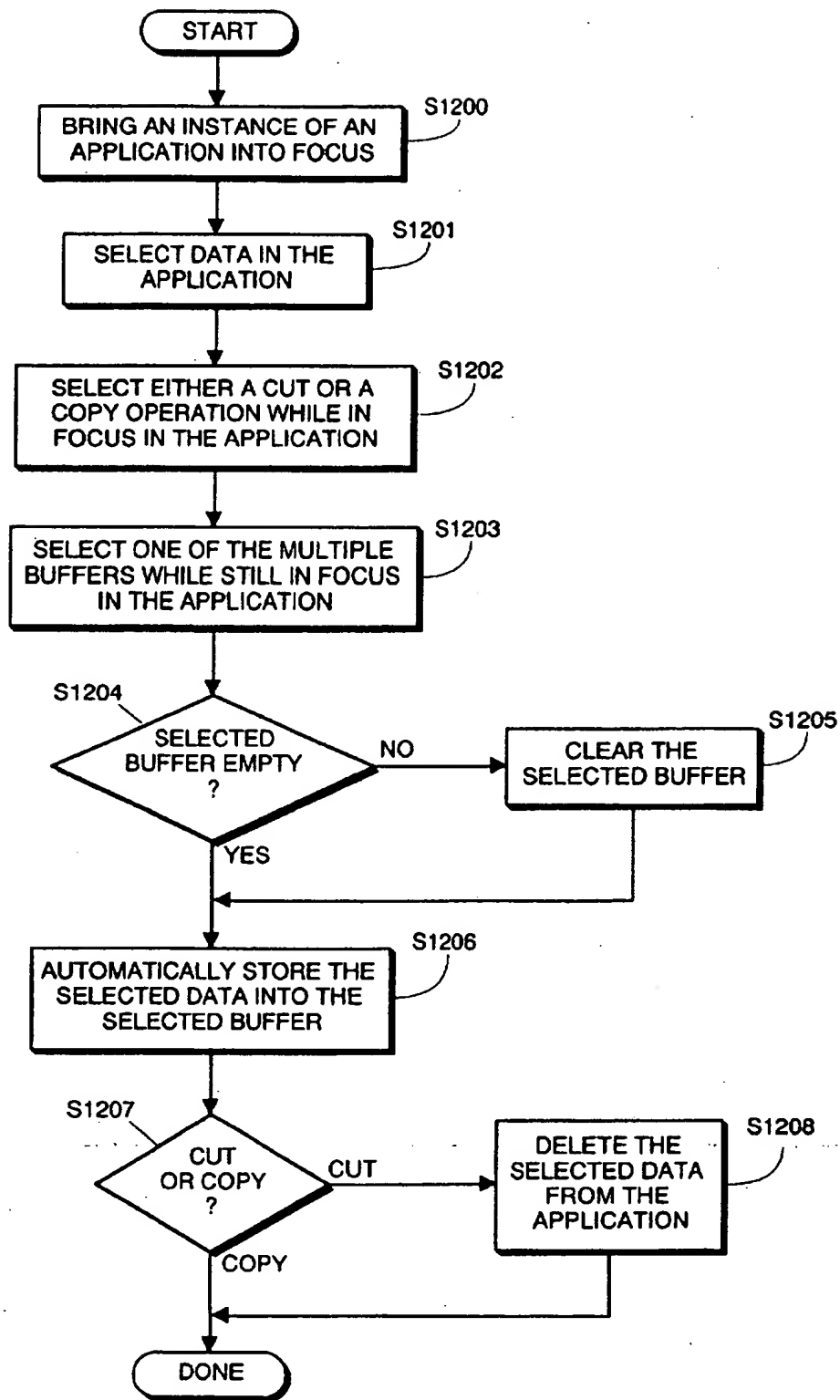


FIG. 12(a)

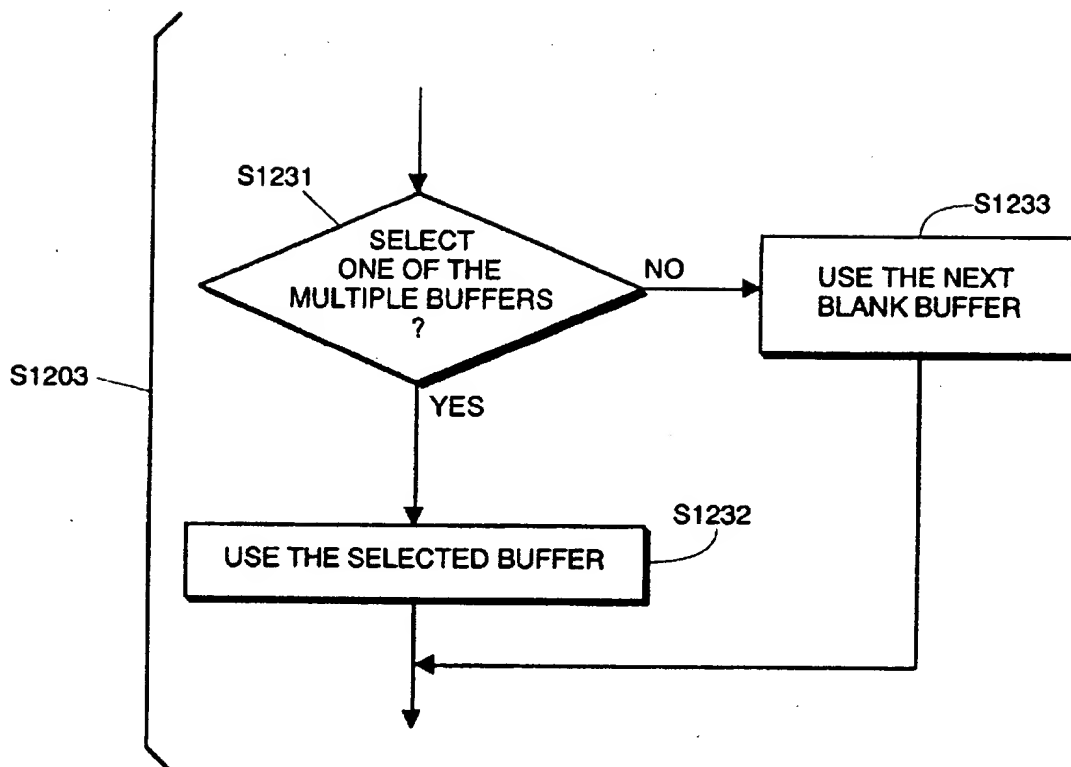


FIG. 12(b)

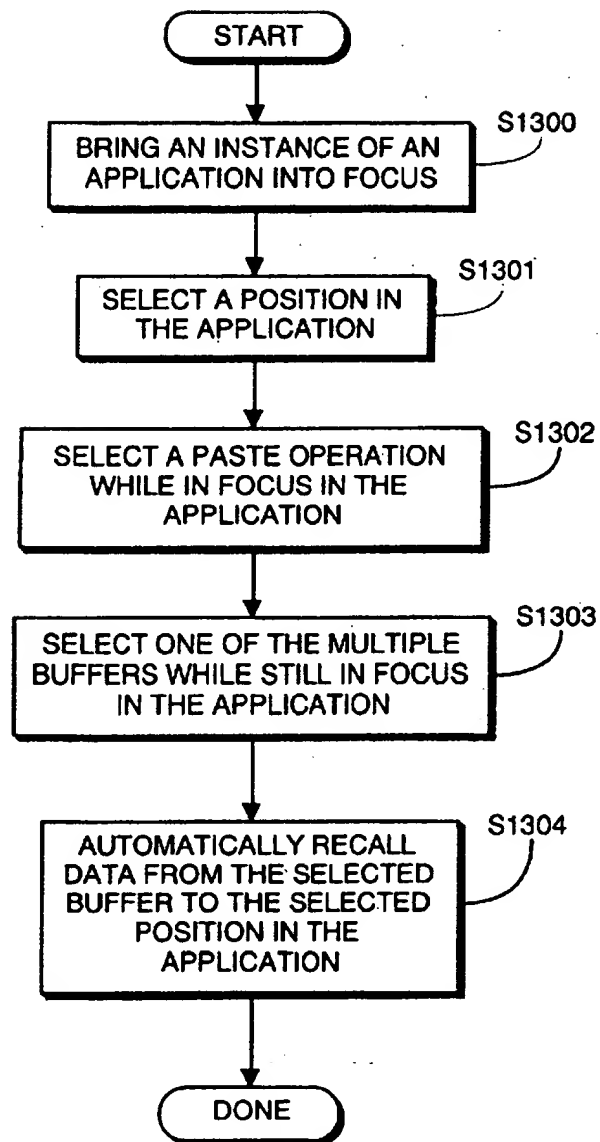


FIG. 13(a)

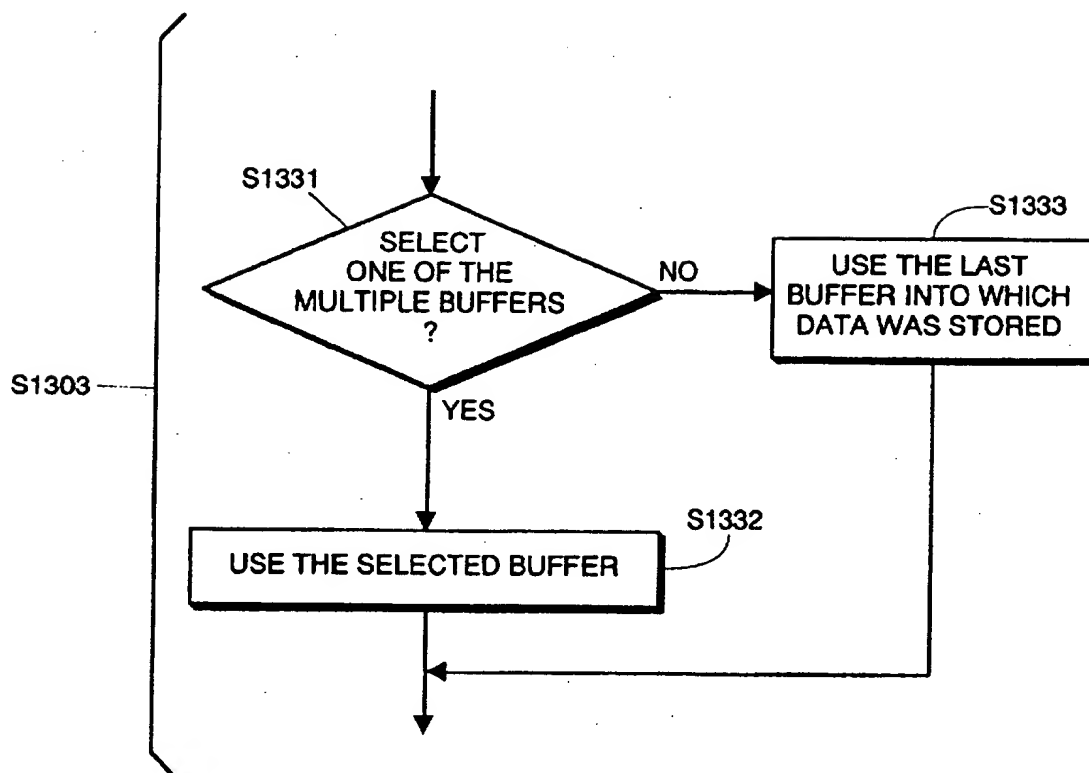


FIG. 13(b)

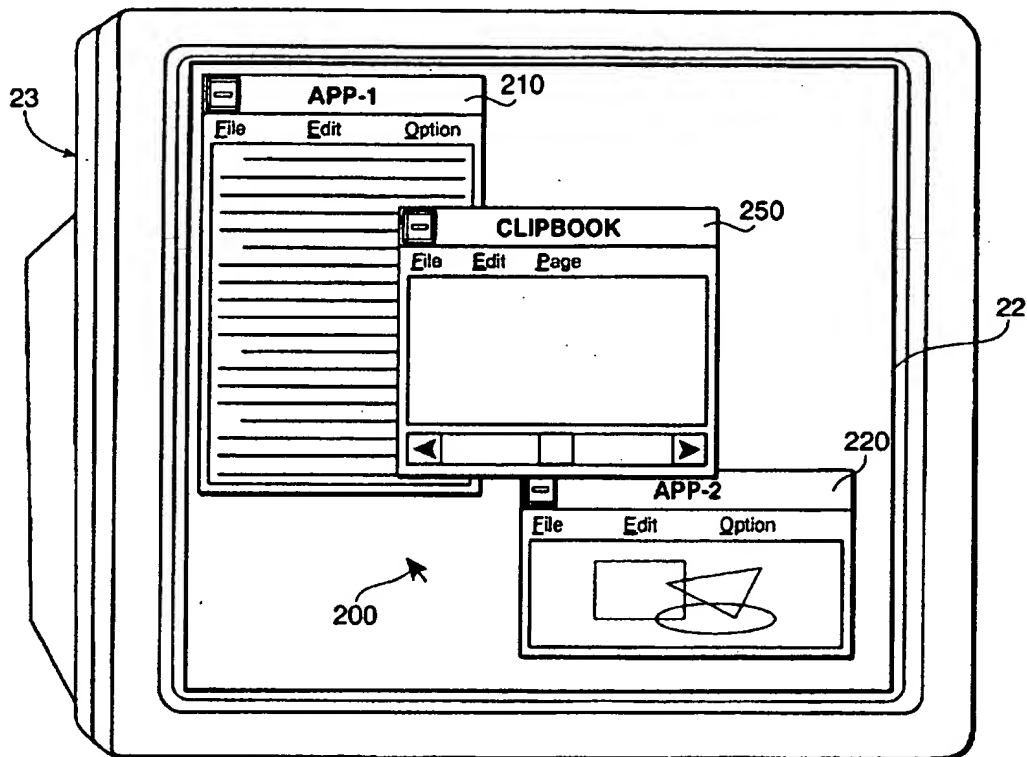


FIG. 14(a) PRIOR ART

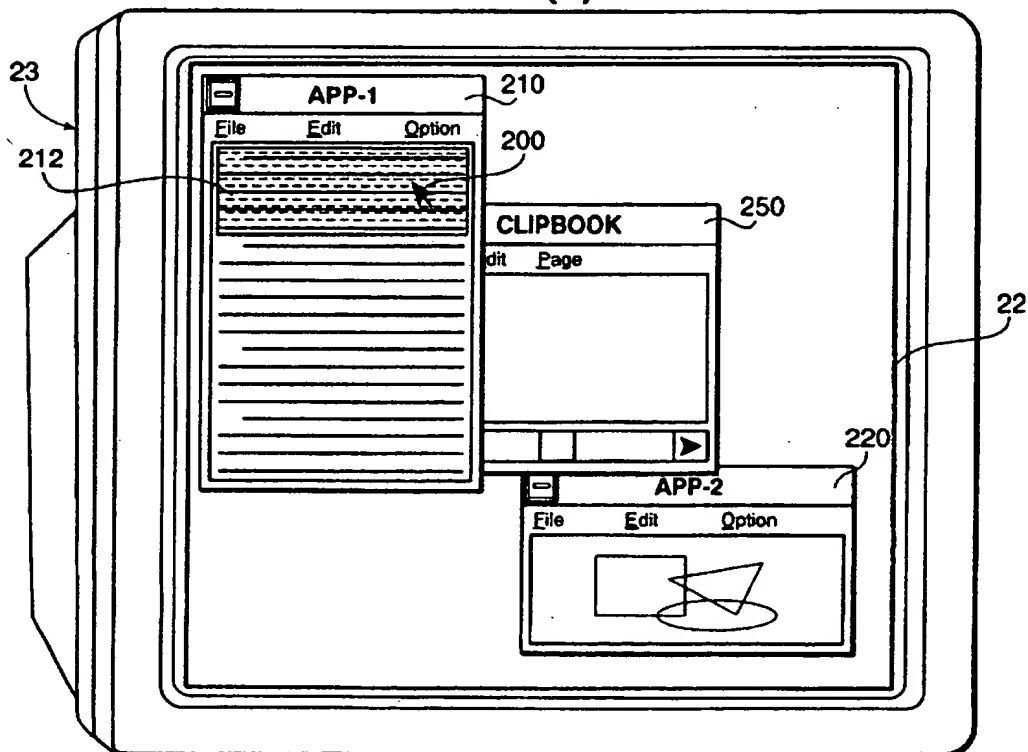
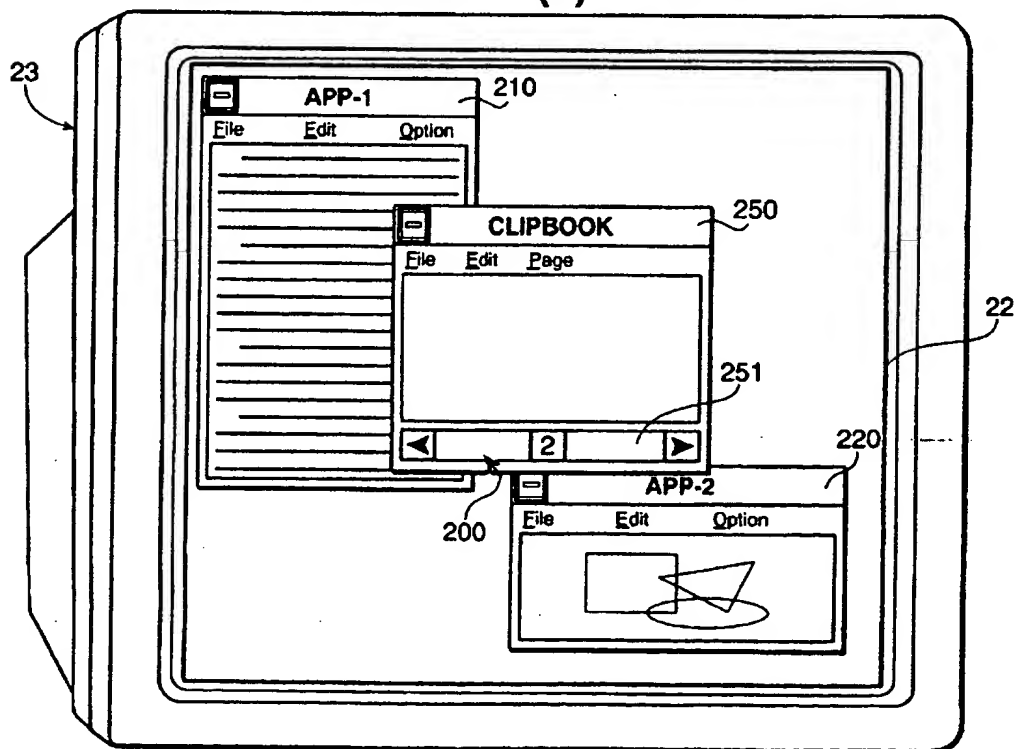
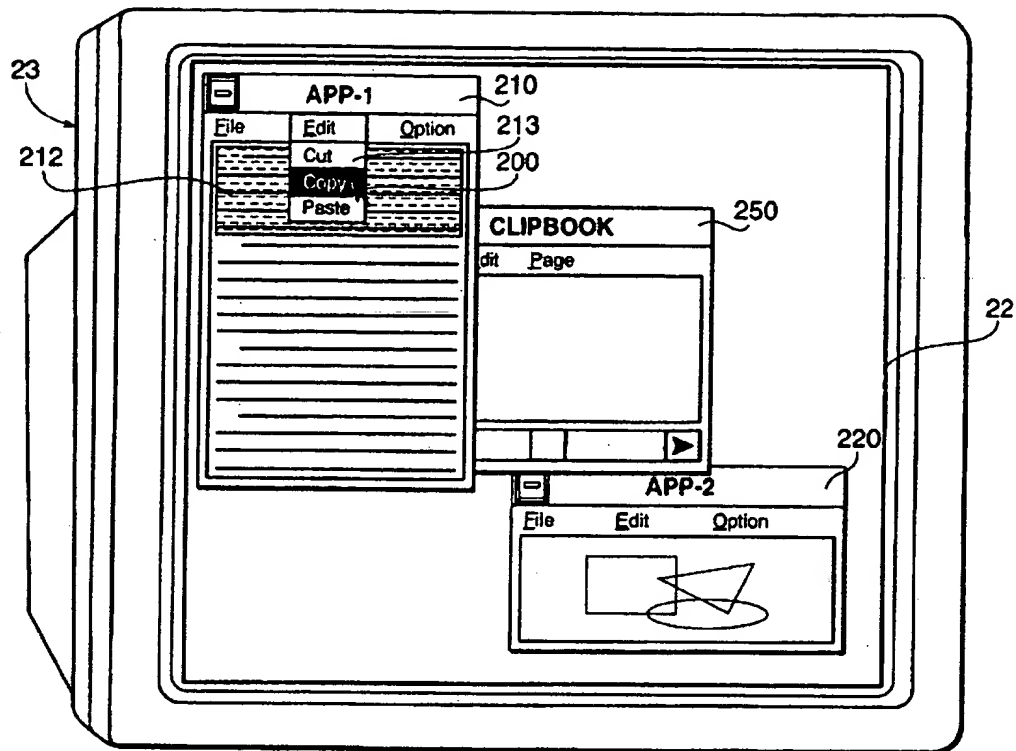


FIG. 14(b) PRIOR ART



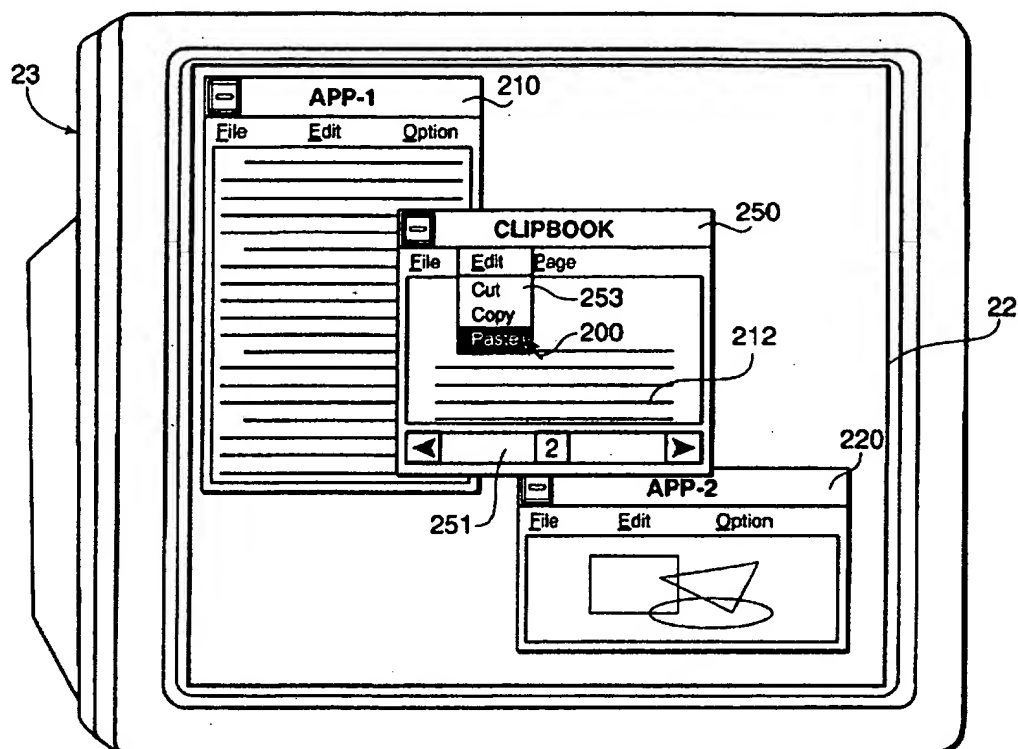


FIG. 14(e) PRIOR ART

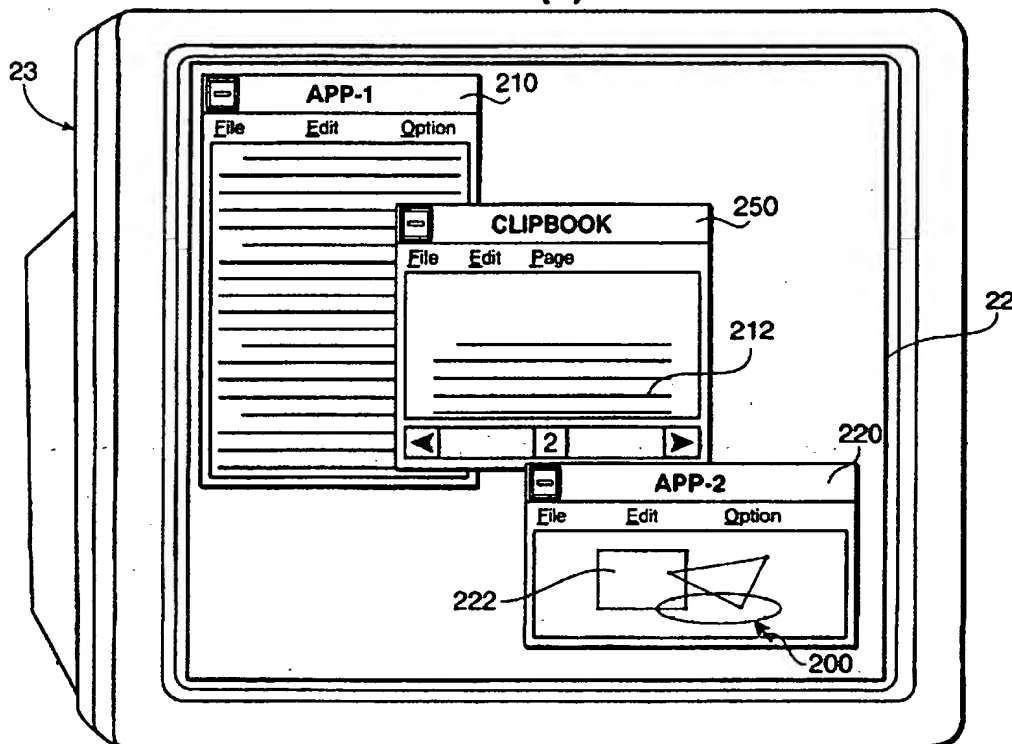
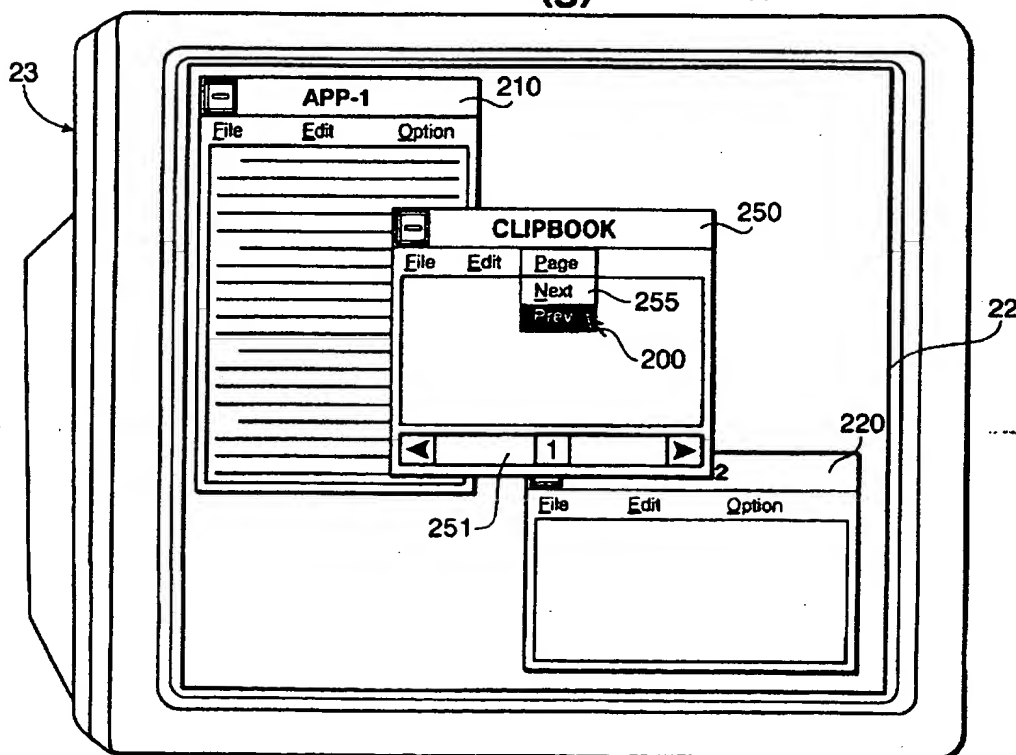
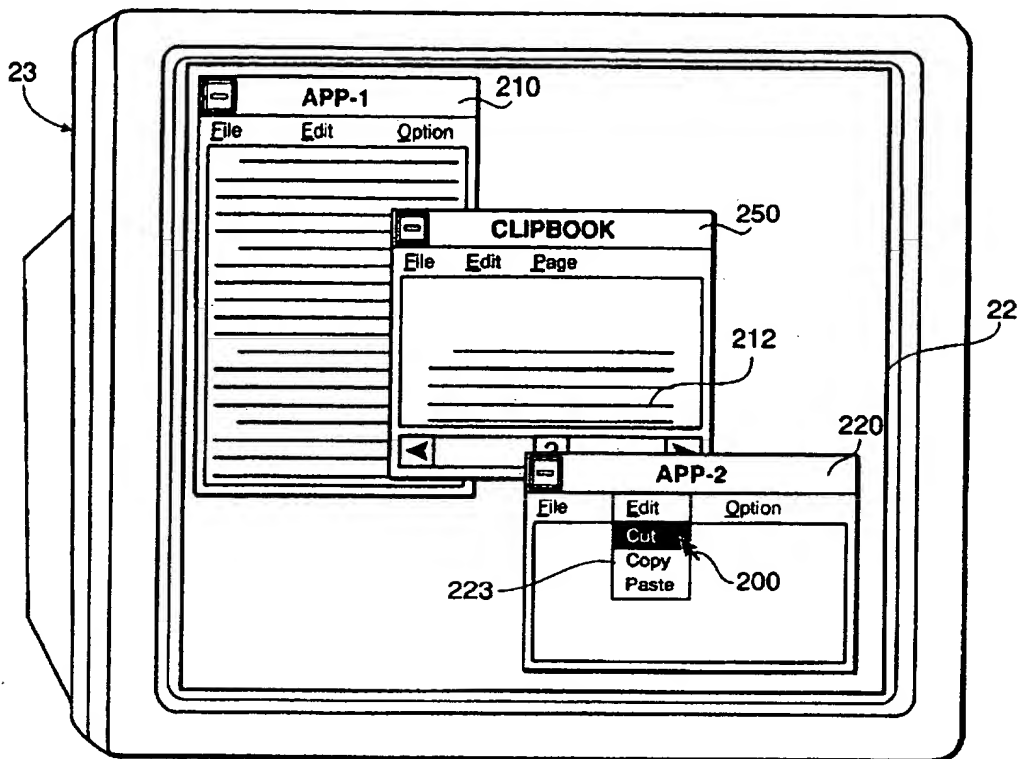


FIG. 14(f) PRIOR ART



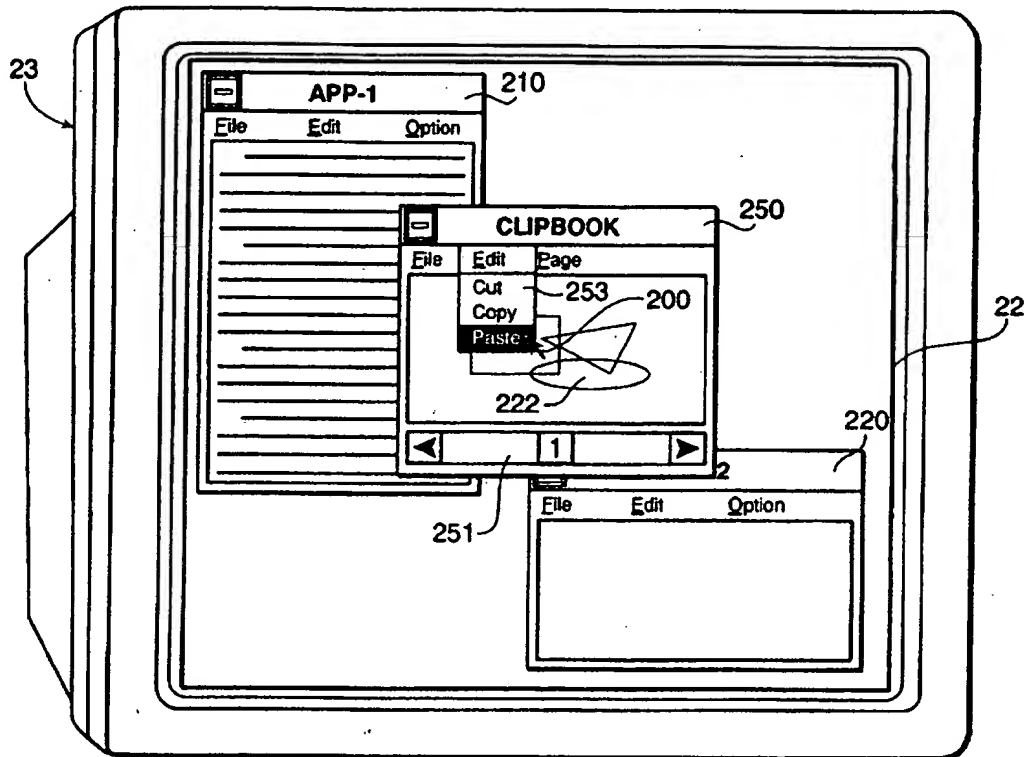


FIG. 14(i) PRIOR ART

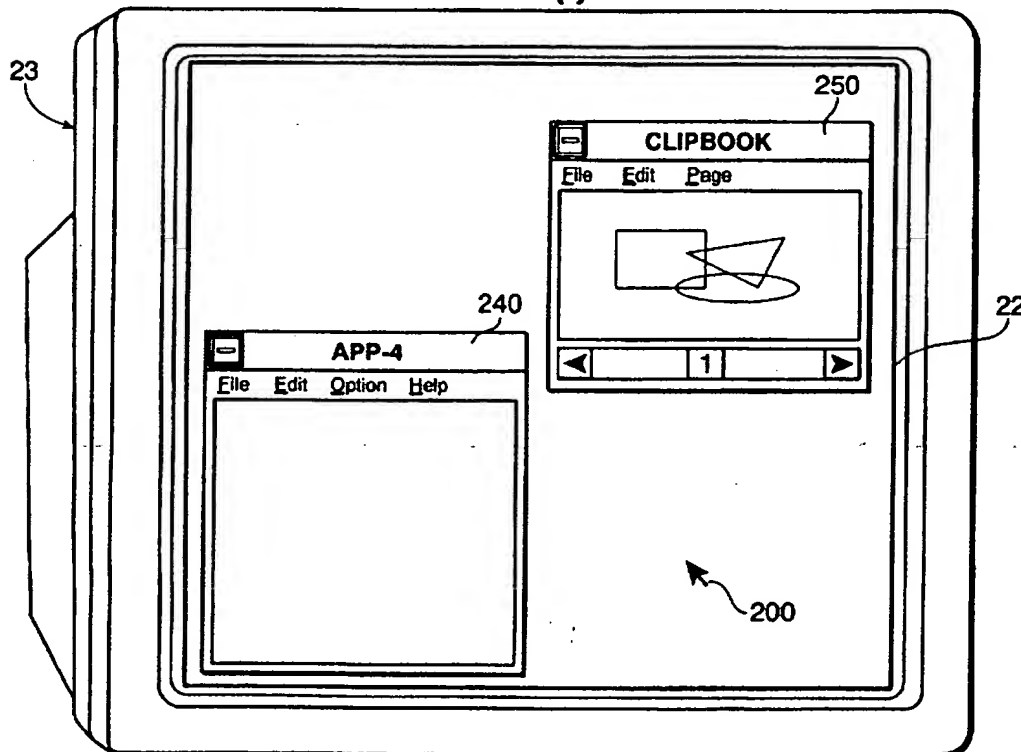


FIG. 14(j) PRIOR ART

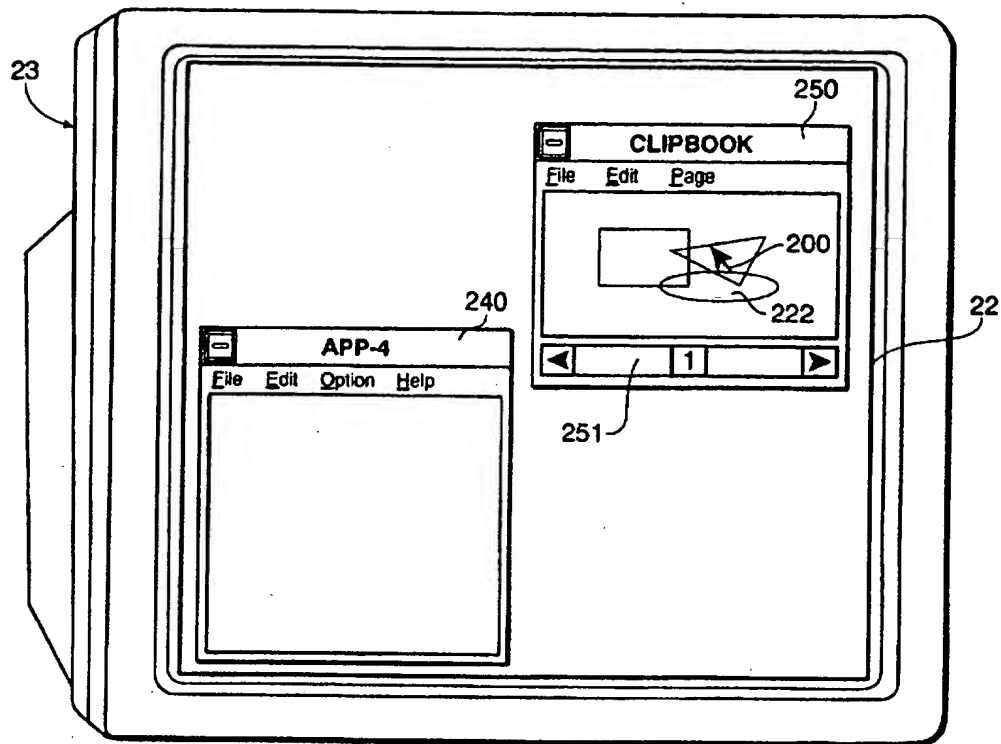


FIG. 14(k) PRIOR ART

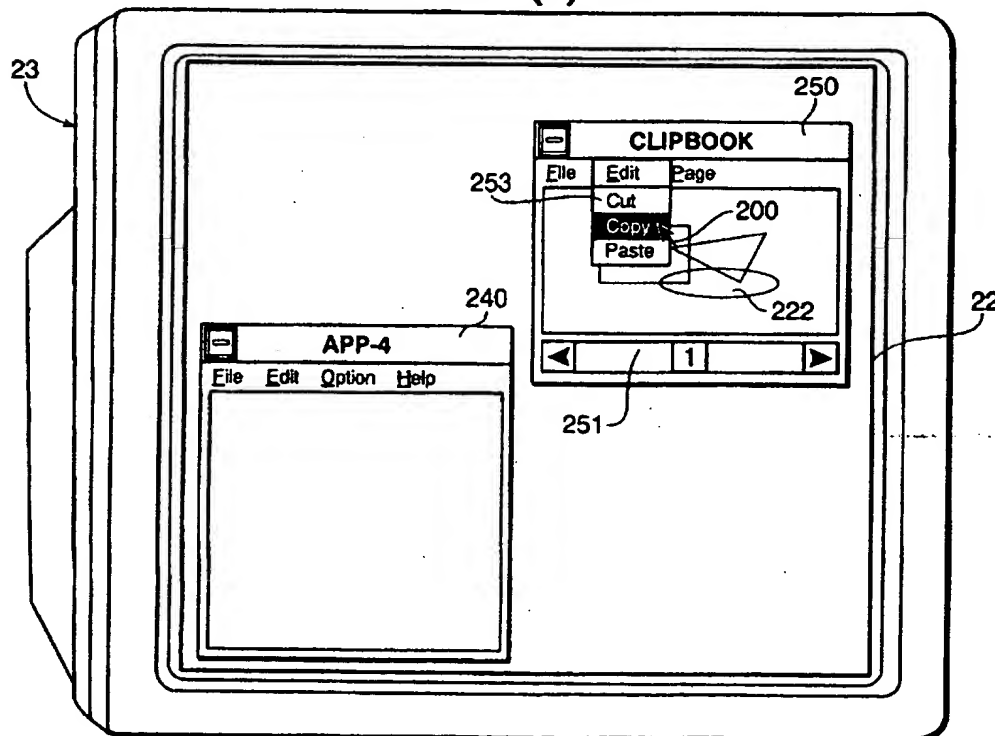


FIG. 14(l) PRIOR ART

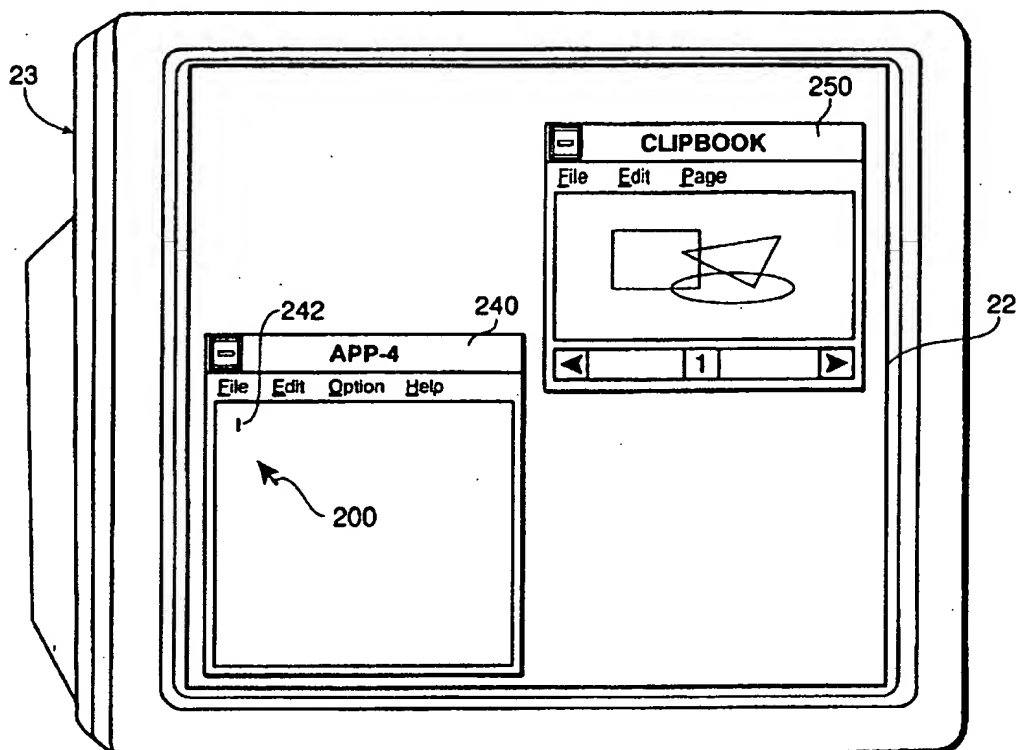


FIG. 14(m) PRIOR ART

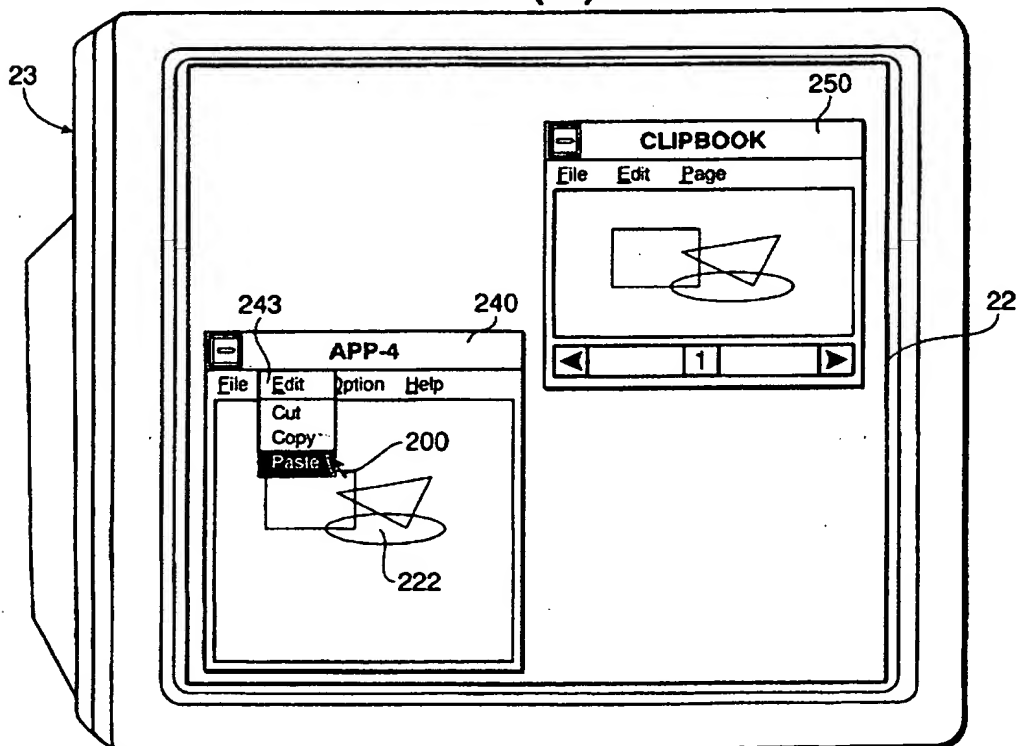


FIG. 14(n) PRIOR ART

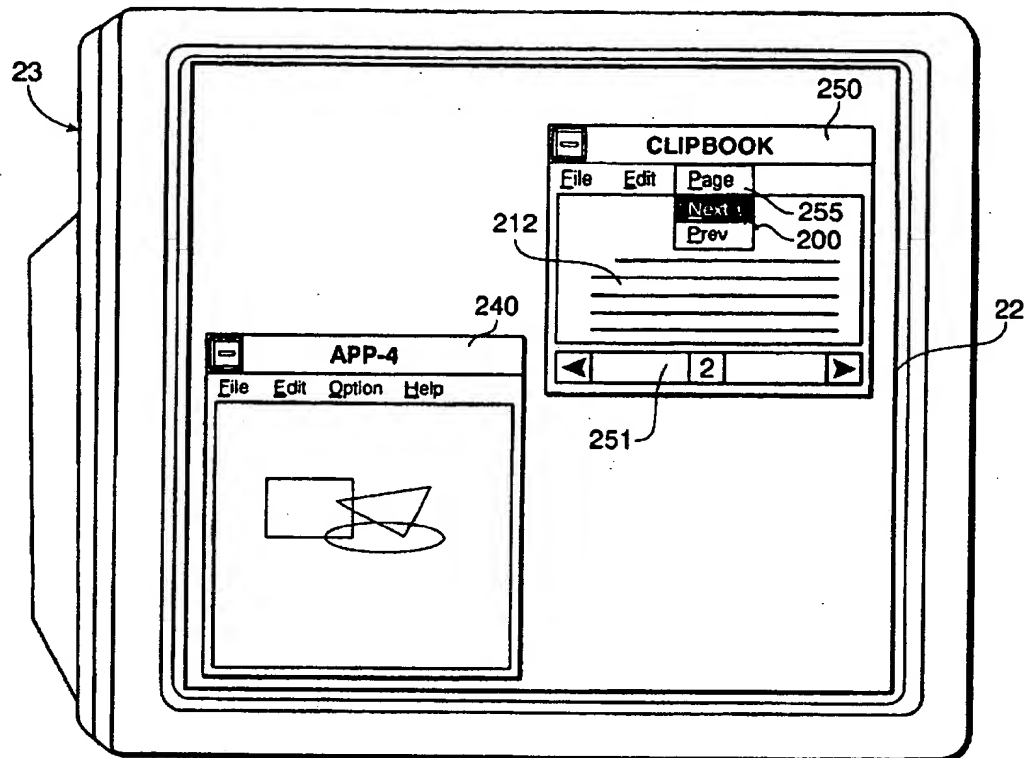


FIG. 14(o) PRIOR ART

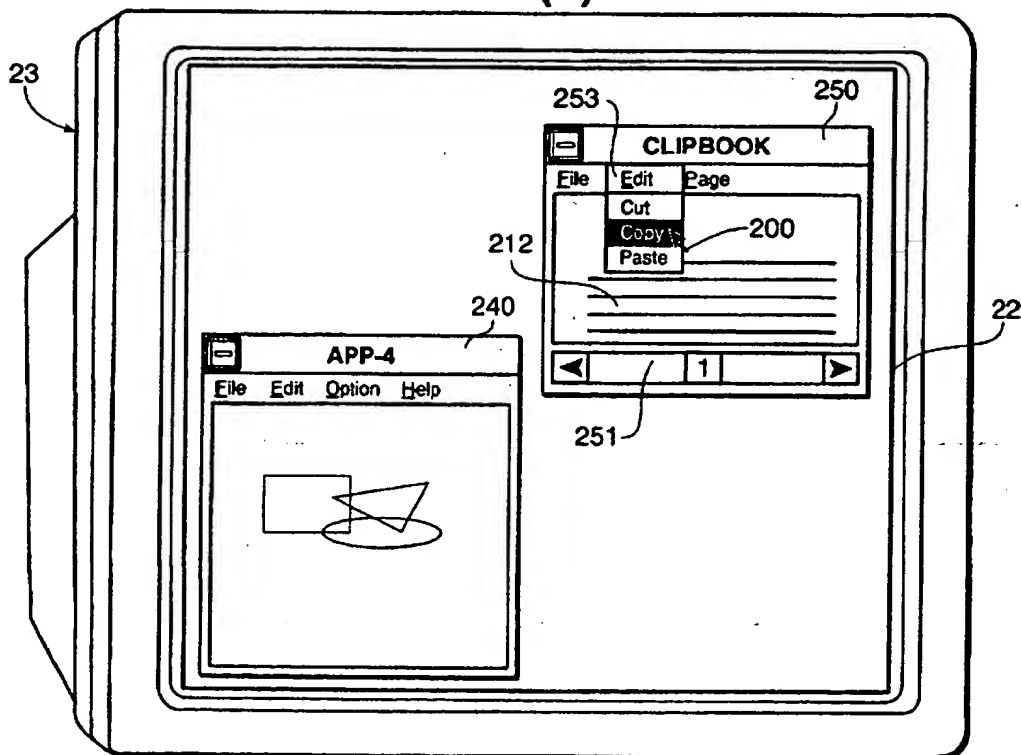
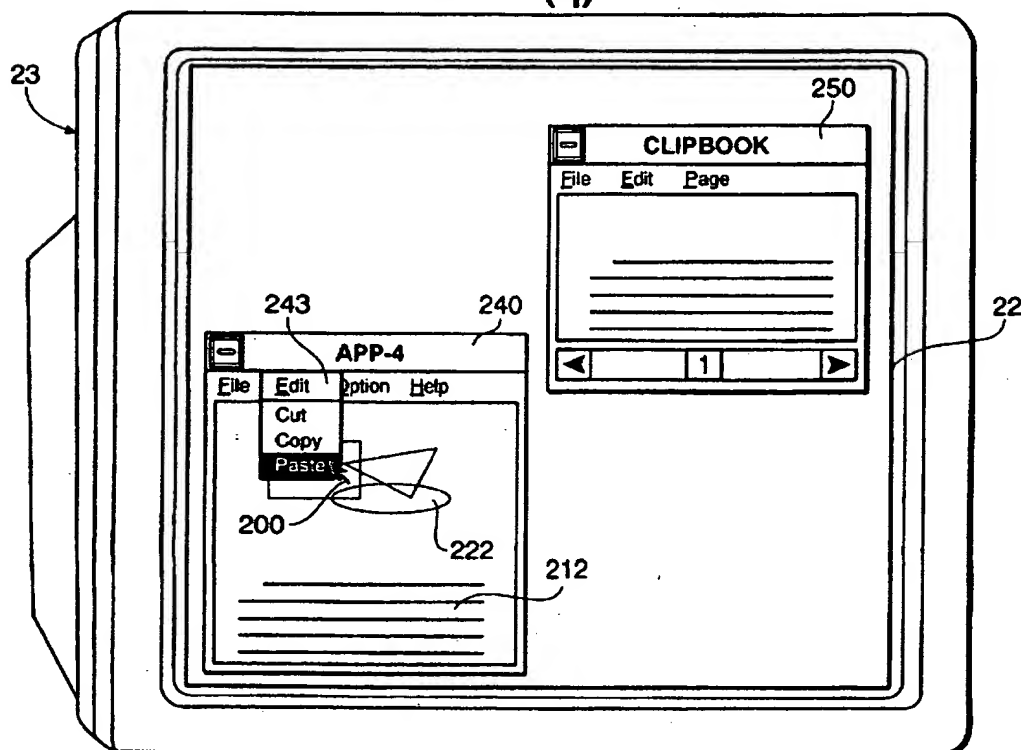
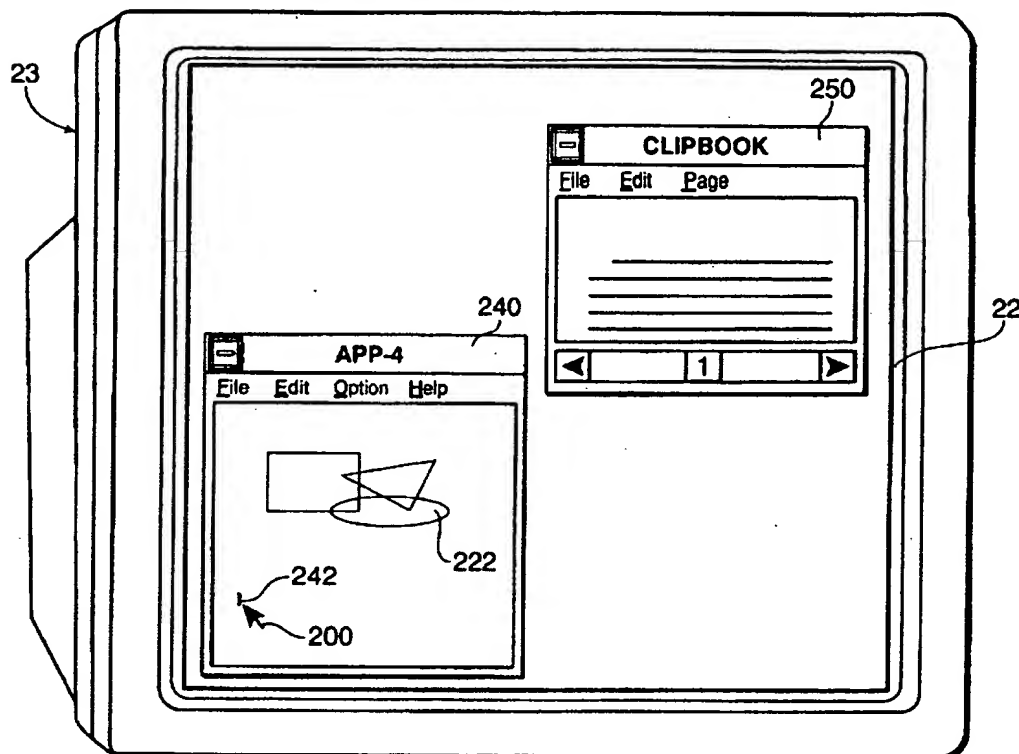


FIG. 14(p) PRIOR ART



DATA TRANSFER SYSTEM

BACKGROUND OF THE INVENTION

1. Field Of The Invention

The present invention concerns a computer-implemented data transfer system which, in a windowing environment, manages multiple memory buffers so as to permit data transfer within or between different application programs. More particularly, the invention allows a user to store multiple data selections into different ones of the multiple memory buffers without leaving focus from an instance of an application program.

2. Description of the Related Art

One advantage of windowing environments is the ability to transfer data easily from one application program to another. A user simply launches both applications (multi-tasking being another advantage of windowing environments), sets focus on the first application and selects data in that application, stores the selected data to a memory buffer, switches focus to the second application, and recalls the data from the memory buffer to the second application.

Conventional windowing environments, such as that provided by Microsoft Window's version 3.1 ("Windows" hereinafter), have only a single memory buffer for transferring data within and between different application programs. In Windows, this buffer is called the clipboard. Because there is only a single memory buffer, whenever data is transferred into the buffer, any old data stored there is lost. This arrangement makes it difficult for a user to transfer multiple data selections, since to avoid data loss a transfer operation for each data selection must be completed before each subsequent data selection can be made.

For example, in order to transfer two data selections from a first application program to a second application program, the following steps are necessary: (1) the first application program must be brought into focus; (2) the first data selection in the first application program must be selected; (3) the data selection must be stored into the clipboard; (4) the second application program must be brought into focus; (5) the position where the data is to be transferred to must be selected; (6) the data must be recalled from the clipboard to the selected position in the second application program; (7) the first application program must be brought back into focus; (8) the second data selection must be selected in the first application program; (9) the second data selection must be stored to the clipboard; (10) the second application program must be brought back into focus; (11) the position where the second data selection is to be transferred to must be selected; and (12) the second data selection must be recalled from the clipboard to the selected position in the second application program.

This cumbersome process is a needless waste of the user's time and efforts, both in terms of the number of steps involved and in terms of the number of times that the user must shuffle between various windows. In addition, the user is restricted to dealing with a single data selection at a time. Since a user can not deal with multiple data selections at the same time, the user can easily forget which one of the multiple data transfers he is currently trying to make, as well as forget how far in a current data transfer he has already progressed.

"Clipbooks" or "scrapbooks" are known attempts to address the difficulties encountered in copying multiple data selections. Clipbooks or scrapbooks are application programs that contain multiple pages, each of which can store

one data selection, so as to allow a user to make multiple data selections without losing prior data selections. However, after each data selection, it is necessary to shift focus away from the application from which data is copied, so as to permit designation of one of the multiple pages onto which the data is stored. This is illustrated in the following example with reference to FIGS. 14(a) to 14(r). In connection with these figures, and throughout the remainder of this specification, the terms "copy" and "paste", as well as "cut" and "paste", are given their conventionally accepted meanings, as defined, for example, in F. Davis, "The Windows 3.1 Bible", Peachpit Press, 1993.

FIG. 14(a) shows a computer display with two application programs, APP-1 210 and APP-2 220, clipbook 250, and cursor 200. In FIG. 14(b), APP-1 210 is brought into focus, as shown by the double border around its window, and text data selection 212 is selected, as depicted by the thick border around the five lines at the top of APP-1 210. In FIG. 14(c), text data 212 is copied into the clipboard (not shown) by use of edit pull-down menu 213. In FIG. 14(d), clipbook 250 is brought into focus, as indicated by the double border surrounding its window. In addition, scroll bar 251 is used to select page 2 in clipbook 250. In FIG. 14(e), text data selection 212 is pasted into page 2 of clipbook 250 by use of edit pull-down menu 253. In FIG. 14(f), APP-2 220 is brought into focus and graphic data selection 222 is selected. In FIG. 14(g), graphic data selection 222 is cut into the clipboard by use of edit pull-down menu 223. (As is known, because the data is "cut" rather than "copied" into the clipboard, graphic data selection 222 is deleted from APP-2 220.) In FIG. 14(h), clipbook 250 is brought into focus and page 1 of clipbook 250 is selected by page pull-down menu 255. In FIG. 14(i), graphic data selection 222 is pasted into page 1 of clipbook 250 by use of edit pull-down menu 253.

At this point, two data selections, text data 212 and graphic data 222, are copied into two different pages of clipbook 250. Now, the user can close APP-1 210 and APP-2 220 and open another application into which data selections can be transferred, as described below in connection with

FIGS. 14(j) through 14(r).

FIG. 14(j) shows newly opened APP-4 240 and clipbook 250. In FIG. 14(k), clipbook 250 is brought into focus and graphic data selection 222 is selected. In FIG. 14(l), graphic data selection 222 is copied from page 1 of the clipbook into the clipboard (not shown) by use of edit pull-down menu 253. In FIG. 14(m), APP-4 240 is brought into focus and position 242 in APP-4 240 is selected with cursor 200. In FIG. 14(n), graphic data selection 222 is pasted into APP-4 240 by use of edit pulldown menu 243. In FIG. 14(o), clipbook 250 is brought back into focus and page 2 of clipbook 250 is selected with page pull-down menu 255. In FIG. 14(p), text data selection 212 is copied into the clipboard (not shown) by use of edit pull-down menu 253. In FIG. 14(q), APP-4 240 is brought back into focus and position 242 is selected. Finally, in FIG. 14(r), text data selection 212 is pasted into APP-4 240 by use of edit pull-down menu 243.

Thus, even though clipbooks and the like allow a user to make multiple data selections without losing data from a prior selection, because a user must shift focus away from the application after each data selection, use of such clipbooks is a cumbersome and unnecessarily lengthy procedure.

Accordingly, there exists a need to allow a user to make multiple data selections without leaving focus from a single application, and to allow a user to transfer multiple data selections within and between applications.

SUMMARY OF THE INVENTION

These needs are addressed by the present invention by providing a data transfer system with multiple memory buffers, each of which can be selected without leaving focus from a currently-active application. By virtue of this operation, the user can move multiple data selections within and between application programs without needless shuffling between the application programs and their respective windows, saving the user considerable time and effort.

According to one aspect of the present invention, a computer implemented method for transferring data from a first application program into at least one of a plurality of memory buffers comprises the steps of bring the application program into focus, selecting data in the application program, selecting a "copy" or a "cut" operation while the application program is still in focus, selecting one of the memory buffers while the application program is still in focus, and automatically storing the selected data into the selected one of the memory buffers. Multiple "copy" or "cut" operations can be made without ever leaving focus of the application program.

Thereafter, data can be recalled from any one of the plurality of memory buffers into a second application program by bringing the second application program into focus, selecting a position in the second application program (if necessary), selecting a "paste" operation while the second application program is still in focus, selecting one of the memory buffers while the second application program is still in focus, and automatically recalling data from the selected one of the memory buffers to the selected position in the second application program. Multiple "paste" operations can be made without ever leaving focus of the second application program.

In another aspect of the present invention, a method for transferring data from a first application to a second application using one of a plurality of memory buffers comprises the steps of bringing the first application into focus, selecting data from the first application, selecting one of the plurality of memory buffers while the first application remains in focus, storing the selected data to the selected one of the plurality of editing buffers, bringing the second application into focus, selecting a position for transferring data into the second application (if necessary), re-selecting the selected one of the plurality of memory buffers while the second application is in focus, and recalling data from the re-selected one of the plurality of memory buffers to the selected position in the second application.

This brief summary has been provided so that the nature of the invention may be understood quickly. A more complete understanding of the invention can be obtained by reference to the following detailed description of the preferred embodiment thereof in connection with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view showing the outward appearance of representative computing equipment.

FIG. 2 is a detailed block diagram showing the internal construction of computing equipment as shown in FIG. 1.

FIG. 3 is a functional block diagram used to explain messaging between a windowing operating system and multiple applications and multiple memory buffers in a data transfer system using multiple memory buffers.

FIG. 4(a) is a flow chart showing operation of the data transfer system during a "cut" or "copy" operation when

storing data from an application program to one of multiple memory buffers.

FIG. 4(b) is a flow chart showing the operation of the data transfer system during a "paste" operation when recalling data from one of multiple memory buffers into an application program.

FIGS. 5 to 11(b) show one representative operation of the data transfer system using multiple memory buffers in transferring multiple data selections from two application programs to two other application programs from a user's point of view.

FIGS. 12(a) and 12(b) are flow charts showing, from a user's point of view, the operation of the data transfer system using multiple memory buffers to copy data from an application program to one of the memory buffers.

FIGS. 13(a) and 13(b) are flow charts showing the operation of the data transfer system using multiple memory buffers to copy data from one of the memory buffers to an application program, again from a user's point of view.

FIGS. 14(a) to 14(r) show prior art processes for transferring multiple data selections between application programs using a clipboard as a temporary storage buffer for the multiple data selections.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a view showing the outward appearance of representative computing equipment incorporating the invention and which can be used for many purposes, possibly including word processing, graphics design, spreadsheets, etc.

Shown in FIG. 1 is computing equipment 20 such as an IBM-PC or PC compatible computer having a windowing operating system such as Windows. Computing equipment 20 is provided with monochromatic or color display monitor 23 having display screen 22, on which computing equipment 20 displays images to the user. Computing equipment 20 is further provided with floppy disk drive 24 with which removable disk media may be read or written. A CD-ROM driver can be used in place of or in addition to floppy disk drive 24.

Computing equipment 20 is also equipped with fixed disk drive 25 as one possible medium for storing the windowing operating system as well as data files and application programs, keyboard 26 for permitting input of text data and manipulation of objects displayed on display screen 22, and pointing device 27, such as a mouse, which is provided for pointing and for manipulating objects displayed on display screen 22. If desired, printer 30 may be provided for outputting documents processed by computing equipment 20.

Also provided are conventional connections to other data and application storage media, such as connection 31 to a network.

In accordance with user instructions, and under control of the windowing operating system, stored application programs such as desktop publishing application programs, drawing application programs, word processing application programs, and the like, are selectively activated to process and to manipulate data.

FIG. 2 is a detailed block diagram showing one possible internal construction of computing equipment 20. As shown in FIG. 2, computing equipment 20 includes a central processing unit (CPU) 40 such as a programmable microprocessor interfaced to computer bus 41. Also interfaced to

computer bus 41 are display interface 44, network interface 45, printer interface 47, floppy disk drive 24, keyboard 26, pointing device 27, main memory 51, read only memory (ROM) 52, and fixed disk 25. Other interfaces may be provided, as appropriate to the overall configuration of computing equipment 20.

Main memory 51, such as random access memory (RAM), interfaces to computer bus 41 so as to provide CPU 40 with access to memory storage. In particular, when executing stored application program instruction sequences such as those associated with application programs stored on fixed disk 25, CPU 40 loads those instruction sequences from fixed disk 25 (or other storage media such as media accessed via network interface 45 or floppy disk drive 24) into main memory 51 and executes those stored program instruction sequences out of main memory 51.

ROM 52 is provided for storing invariant instruction sequences such as start-up instruction sequences of basic input/output operating system (BIOS) sequences for operation of keyboard 26.

As shown in FIG. 2, fixed disk 25 stores program instruction sequences for windowing operating systems and various application programs, document files, and other data files. Fixed disk 25 can also store any number of other types of files.

[Windowing Operating System]

A user interacts with application programs by means of the windowing operating system. This operating system is used to start instances of application programs, to interact with those application programs, and to close instances of application programs.

An instance of an application program is simply one copy of an application program that is running at one time. Multiple instances of a single application program can be run at once. Each instance is typically represented by a window or windows. Each instance of an application program has its own data, and is a separate entity from the perspective of the user.

[Data Transfer System]

FIG. 3 is a functional block diagram showing the interactions between user inputs, window operating system 100, applications 104, and a "copystack" memory 106 for a data transfer system with multiple memory buffers for storing data selected from an application to a selected one of the multiple memory buffers. Preferably, the number of memory buffers in copystack 106 is automatically increased, up to some predetermined number such as 20, by the windowing operating system 100 so that there is at least one blank memory buffer into which new data can be stored. The memory buffers are system-wide buffers in that they can be accessed by any application program running under windowing operating system 100.

In FIG. 3, the copystack and data transfer system are treated as part of the windowing operating system. It should be understood, however, that other arrangements are possible. For example, one other possible implementation is to provide multiple system wide memory buffers separate from the windowing operating system, such as in an add-on utility or through use of OLE ("object linking and embedding") 2.0 protocol. As another possible implementation, the multiple memory buffers might be included by pre-arrangement in a suite of software applications.

In FIG. 3, the data transfer system involves interaction among windowing operating system 100, applications 104, and copystack 106 for multiple memory buffers. The user input 102 is via a graphical user interface (GUI).

FIG. 4(a) is a flow diagram illustrating execution of stored program instruction sequences by which the data transfer

system operates during a "cut" or "copy" operation so as to store data from an application program to a user-selected one of multiple memory buffers. Thus, in response to user designation of a "cut" or "copy" operation in step S401, flow advances to step S402 in which the active application sends a message (depicted at 402 in FIG. 3) to operating system 100 advising the operating system that the user has selected a "cut" or "copy" operation, and requesting operating system 100 to provide data needed by the application so as to effectuate the "cut" or "copy" operation. Such data might include, for example, the location of a memory buffer into which data from the application should be stored, as well as data needed by the application so as to draw an appropriate menu for the user to select desired parameters (such as total number of memory buffers in the copystack, type of data stored in each memory buffer, and the like) for the "cut" or "copy" operation. Operating system 100 responds in step S403 by sending a message to copystack 106 (depicted at 403 in FIG. 3) advising copystack 106 that a memory buffer is needed for a "cut" or "copy" operation. Copystack 106 responds by reserving memory for a new memory buffer and, in step S404, sending a message (depicted at 404 in FIG. 3) to operating system 100 relaying copystack information such as the location of the new memory buffer, the total number of memory buffers now available for a "copy" or "cut" operation, and the kind of data (such as text, graphic, spreadsheet, etc) in each of the different memory buffers. In step S405, the operating system sends a message (depicted at 405 in FIG. 3) to the application so as to relay the copystack information. At step S406, the application stores data selected by the user to a user-specified copystack memory buffer (or, in the absence of user specification, to the default copystack memory buffer), whereafter data is optionally deleted at step S408 in dependence on whether a user has specified a "cut" operation or a "copy" operation (step S407).

FIG. 4(b) is a flow diagram illustrating the stored program instruction steps executed by the data transfer system during a "paste" operation so as to recall data from one of the multiple memory buffers in copystack 106 to an active application program.

Thus, in response to a user selection of a "paste" operation (step S410), flow advances to step S411 in which the active application sends a message (depicted at 411 in FIG. 3) to operating system 100 advising operating system 100 of the "paste" operation. In step S412, operating system 100 sends a message (depicted at 412 in FIG. 3) to copystack 106 requesting for copystack 106 to provide copystack information. Copystack 106 responds in step S413 by sending a message (depicted at 413 in FIG. 3) to operating system 100 with the needed copystack information, namely the number and locations of memory buffers currently being managed by copystack 106, as well as the type of data stored in each memory buffer, the identity of the last-accessed memory buffer and the like. Flow advances to step S414 in which operating system 100 sends a message (depicted at 414 in FIG. 3) to the active application relaying copystack information. Based on the copystack information so provided, the active application draws an appropriate menu for the user to designate parameters for the "paste" operation, such as which of the multiple memory buffers to recall data from. In step S416, after selection of one of the multiple memory buffers (which may be by user-selection or by default selection such as the last-accessed memory buffer), data is recalled from the selected memory buffer to memory which is accessible by the active application. Thereafter, in step S417, the selected memory buffer is closed.